BUTANE-PROPANE News

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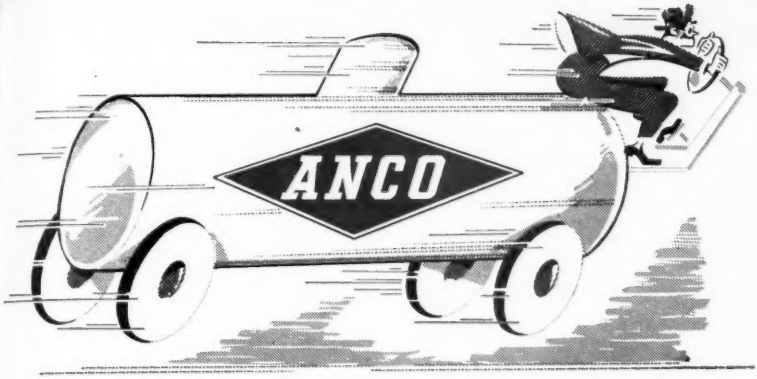

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LETTERS

Gentlemen:

I have recently gone into business of my own and I am very interested in your latest catalog on butane-propane appliances and equipment. I would appreciate very much your sending this information at your convenience.

T. N. Herring

The above letter contained no address so we could not comply with the request.

If Mr. Herring, or anyone knowing him, will send us his address, we will follow through.—Ed.

•

Gentlemen:

How far do you suggest that we run a low pressure line for a 60-40 mixture of butane gas?

We will serve a tourist court with hot water from a 75-gal. LP-Gas heater. Would the pipe cool the hot water as much as 10% if run underground for 150 ft? How much?

H.M.C.

Mississippi

You can run a 60-40 mix as far as you want as long as you have pipe of sufficient size to have a maximum pressure drop of ½ in. of water.

On Pages 70-71 of "The Bottle Gas Manual," which we publish, you will find the size of pipe and the distances that can be run for various loads for propane. This sizing will be okay for 60-40 mix.

Our experience has indicated that satisfactory installations for hot water service for auto courts running distances as much as 150 feet will require a circulating system for economical use of both water and fuel.

This is done by running the hot water line from the water heater to the cottages and returning from the end of the line with a return line to the water heater. A small circulating pump is installed in the return line at the water heater to keep hot water circulating through the loop. Both lines should be insulated to prevent undue heat loss.

An installation of this type costs a little more but will give good service and make a satisfied customer, as well as tenant.—Ed.

•

Gentlemen:

We wish to know whether it is necessary or advisable to provide butane-propane tanks with a light exhaust pipe.

J.V.S.

Belgium

It is good practice to install a vertical vent pipe from the safety valve outlet on plant storage tanks. We would suggest the use of pipe about 10 ft. long.

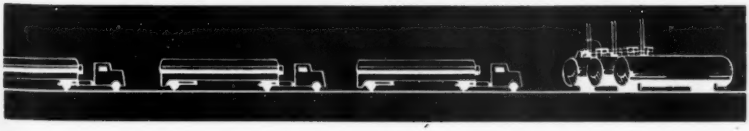
In case the safety valves open for any reason, the escaping vapors are high enough in the air to become well dissipated which prevents causes of fire due to accumulation of vapor.

In case the tanks themselves are in a fire, the valves will open and the gas will burn as a torch from the end of the pipes and the flame will be far enough away to prevent the overheating of the top of the tank shell.—Ed.

•

Gentlemen:

We have just started selling the larger (500-gallons) propane systems, and since we don't have a de-



livery truck we have an agreement with a dealer in a neighboring town to supply us.

Recently we delivered one of these tanks and he put 520 gallons of propane in the tank, according to his meter, to fill it 80%. The tank was marked 499 water gallons. He claims the first 100 gallons goes into vapor.

In filling, he left the vapor return hose blow into the air for the first 100 gallons before attaching to the truck tank. We would like to know if this is the right procedure. The temperature in this instance was 60 degrees.

J.H.

South Dakota

When filling a new tank it should be purged of air, but this can be done with 10 to 15 gallons of propane for a 500 gallon tank.

If your supplier does not have a differential back pressure valve on the discharge of his meter, it is possible that the meter registered vapor instead of liquid on part of the fill, causing the discrepancy.

The amount of vapor in the tank above the liquid level at 80% and 60°F. would amount to approximately 2½ to 3 gallons.—Ed.

•

Gentlemen:

We are making installations of add-on tanks in this area, and in a number of instances we are connecting propane tanks with butane tanks. In a few cases we have had difficulty with the regulators on the old installations when we turned the gas on at the new tank.

We should like to know what effect the varying inlet pressures of the butane and propane tanks have on the regulators, and whether or not both tanks should be left on at the same time.

Also if we should install cut-offs in the lines in front of the regulators in order not to have back-pressures when one of the tanks is empty or turned off while the other one is being used.

We have been advised by another dealer that we should connect the tanks together and use only one regulator on the house line.

C.H.B.

Texas

When you have a regulator working on a tank with a high inlet pressure and one on a tank with a low inlet pressure with the outlets manifolded into a common line, the tendency will be for the flow to come from the tank with the highest pressure.

There should be no ill effects upon the regulators when set in this way as the down stream pressure controls the opening and closing.

The tanks should not be connected directly together if propane is being used in one and the other is designed for butane-mix vapor pressure. There is no need of shut-off valves on the down stream side of the dual regulator setup.

We do not see any reason for your trouble with the old regulators unless it just happened that they needed attention.—Ed.

•

Gentlemen:

We would appreciate your opinion regarding our bulk plant.

As the bulk plant now stands, there is the possibility of the smaller tanks filling up completely if by chance the vapor lines on the top of the tanks and the suction and fill line valves at the bottom are left open so that, if No. 1 tank which is higher, was open, the liquid would seek its level and fill the smaller tanks.

The plant men have been instructed to keep tank No. 1 closed when the lower tanks are open, and vice versa. The entire system is shut off at night. However, we are safety conscious and realize the human element involved. Each of the five tanks is equipped with three Rego No. 3134G safety relief valves.

We have encountered a diversity of opinion regarding the installation as it now stands. One opinion is that a three-way valve should be inserted in the line so that the large tank would be cut off from the smaller

tanks on the assumption that the relief valves will not handle liquid.

The other opinion is that the valve is unnecessary for the following reasons:

1. That a possibility of such a mistake would be very slight because, in the event the valves were left open, the large tank would have to be full enough to fill the small one. and the vapor return lines would have to be open, the weather warm, and then all the valves would have to be closed to prevent a return to the large tank. The argument advanced is that such a series of events would almost have to be intentional to be accomplished.

2. If such a chain of events were to happen, the relief valves would handle the expanded liquid, and that the hazards from such relieved pressure would be minimized as the nearest dwelling (other than the plant buildings) is more than 500 feet away.

3. It would involve a difficult piping problem as we would have to run new piping to take care of the four small tanks.

Inasmuch as we have already equipped the tanks with triple relief valves, and while we want to be on the safe side, we also would like to be practical in this matter.

J. C.

North Dakota

It is important that vapor space be allowed in your tanks. Due to your isolated location, your hazard is not as great as it might be, but a fire under or near your tanks when they were liquid full would cause an undue amount of emission from the safety valves with a consequent increase of heat for exposure.

A three-way valve in the liquid line will help your condition.—Ed.

•

Gentlemen:

One of our customers, a doctor, is planning to heat the rooms of his new clinic with unvented radiant heaters on LP-Gas. He thinks it probable that patients may have to sleep in two of these rooms in cases of emergency.

What he wants to know is: Is there anything in any of the codes, National Board of Fire Underwriters, American Gas Assn., etc., against this practice? Flues were not considered when the building was erected and it would be very hard to vent the heaters now.

G.C.E.

Tennessee

There are local rules but no general rules on unvented heaters. For sleeping rooms some type of ventilation is essential for any gas-fired heater, such as an open window or door or a wall vent or door vent, as the heater must have a supply of air to operate. If there is no air source, the heater will use up all the oxygen in the room.—Ed.

•

Gentlemen:

How can I compare natural gas for heating and cooking with butane—

Butane 12c a gallon

Natural $1.25 first 1000 cu. ft.
.75 next " " "
.75 " " " "
.75 " " " "
.66 thereafter

If I use 10,000 cu. ft. it will cost $7.46. How much will it cost to get this much out of 12c a gallon butane.

Also compare 3c a killowat hour of electricity to 12c butane.

H.E.

Mississippi

One thousand Btu per thousand cubic foot natural gas is approximately equal to one gallon of butane. Thus, $1.25 gas would be about the same as 12½-cent butane, and $.66 gas about the same as 6.6-cent butane.

Three-cent electricity is approximately equal to butane at 50 cents per gallon.—Ed.

•

● **BUTANE-PROPANE** *News* **welcomes letters from our readers, but it must be understood that this magazine does not necessarily concur in opinions expressed by them.—Editor.**

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"QUALITY YOU CAN SEE"

WATER HEATING

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HEATING

REFRIGERATION

Buehler's insistence upon fine quality in the building of LP-Gas Plants has brought an ever-increasing number of new customers and a wider trade acceptance of Buehler products everywhere.

The Trend among LP-Gas dealers is definitely toward Buehler. We strive, through our various sales aids to help dealers sell their entire line of equipment and services.

Write us for full information today.

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COMMENT

THE CAMPAIGN for larger consumer storage tanks is bringing excellent results and thousands of tanks of from 500 to 1000 gallons have replaced the smaller sizes that had to be refilled two or three times every winter to keep the owners in gas.

Industry associations in many states have been leading influences in inducing dealers to carry to their consumers the reasons for past shortages and the answer to future supply.

The Louisiana Butane Dealers Assn. went so far as to hire an advertising agency to conduct a state-wide newspaper publicity and advertising program. It met with remarkable success. The Kansas and Texas associations are also using newspaper and magazine advertising.

•

IT LOOKS LIKE the supply problem is approaching a happy solution. There will be a substantial increase in production by the end of '48, many new tank cars and transport trucks are in service, and there is a far greater volume of storage at consumers' premises than ever before.

Now, if there is no war, and the steel shortage eases up, and no dealer pirates accounts or cuts prices, LP-Gas men can look forward to the coming winter with renewed optimism!

•

BUT, there is one sad part to the story. Many dealers haven't tried hard enough to sell large supply tanks to their customers and others have tried unsuccessfully.

So again there will be some complaints and some cold homes next winter.

The campaign must go on—continually—for there will be more and more demand for butane and propane in other fields and never will dealer and user be reasonably safe till two refills per year—spring and fall—are large enough to meet the entire 12 months' needs.

•

THE NATIONAL Butane-Propane Assn. is all set for its most pretentious convention and trade show.

It is the third year that this organization has sponsored similar

affairs. The place is the Congress Hotel, Chicago, and the dates are Sept. 20-22.

•

REPORTS are coming from the Gas Appliance Manufacturers Assn. which verify earlier rumors of industry growth that were so extreme many refused to accept them as even near the truth.

Actual figures show that in 1947 20% of the 1,800,000 gas water heaters made went to LP-Gas customers. In figures, that is 370,000.

Of the 2,390,000 gas ranges made in 1947, 620,000 (26%) were for butane and propane.

Some manufacturers of appliances are selling as much as 45% of their production into our industry.

•

ACCIDENTS are caused by doing things wrong, said a safety expert recently. Accidents are the result of mistakes of judgment or mistakes of action.

Study any accident you wish, and you will find this to be true.

•

LP-GAS DEALERS must render a responsible service and they should not sell more systems than they can supply with gas during the months of high demand.

The conscientious dealers realize their public obligation and strive to meet it. There are some, however, who will make installations and take the first profit upon appliance sales whether or not they can make later fuel deliveries.

Every industry has to police itself to hold down avaricious operators.

•

THE WALL STREET JOURNAL is the latest national medium to feature LP-Gas.

On the front page of its August 12 edition is a rattling good story that makes fine publicity for the industry—written by Robert J. Sullivan, of the Journal's Los Angeles office.

It's pretty accurate, too, a virtue not always attained by national publications in their articles upon this subject.

•

THERE ARE reported to be more than 3,000,000 tractors on American farms today. This is twice as many as before the war. It is estimated they will burn 2,850,000,000 gallons of fuel this year.

If a fair proportion of these were using butane or propane, many dealers would have a better balanced fuel load.

Irrigation pumps running on LP-Gas, make a beautiful summer load—pure gravy for the firm selling the fuel.

By Ed

No LP delivery problem here!

There's a good reason! The hose above is Monarch Propane-Butane Hose.

That means the LP gas is being delivered with maximum speed, safety, and efficiency.

Monarch Propane-Butane Hose is built by Hewitt *especially* for LP delivery jobs. Whether you're handling LP gases from bulk storage to tank cars . . . or to cylinders . . . or from tank trucks to consumer storage . . . you save time and money with Monarch.

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You get protection because Monarch will withstand *several times* the pressures encountered in LP deliveries. It's sturdily built for utmost safety!

Why not get full details on Monarch Propane-Butane Hose for LP delivery service? Write Hewitt Rubber Division, 240 Kensington Ave., Buffalo 5, N.Y.

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JOHN M. ROBINSON
Guest Editor

"Organize and Prosper"

By JOHN M. ROBINSON
President National Butane-Propane Association

AN accepted authority on business accounting says that the working capital of a business is the excess of its current assets over its current liabilities. In the words of the butane-propane gas industry, working capital can probably be said to be that which most operators do not have enough of. The grammar is poor, and so is the choice of words, but the thought will be readily understood.

A prominent investment counsellor recently said that almost without exception businesses are today short of working capital — even those which have not expanded their volume of operations.

Membership in an association will not automatically cure your problems of shortages of working capital. For that matter, membership, alone, will probably not as a rule automatically cure very many of your problems. But we know from actual experience that the occasions when competitors can get together are opportunities for discussion of their many problems, including those of working capital. And we have yet to experience such a session which failed to bring up some ideas of help for someone.

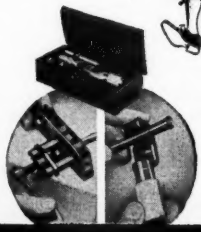
That is the real value of organizational activity—the ability to get together with those whose place in business is similar to your own and to talk over your problems. It doesn't make much difference whether the problems are related to sufficiency or insufficiency of working capital, other items of financing, safety regulations, current new laws, taxing difficulties, or any of the multitude of problems which exist in any business, new or old, and which exist in larger numbers in a business as new as the butane-propane gas industry.

Association membership—and participation (I stress the participation), will go a long way toward improving the operation of any business.

Look to Penn

FOR 'Superior' TUBING IN THE BOTTLED GAS INDUSTRY

Liquefied petroleum demands tested tubing of 'Superior' quality. Penn's seamless tubing is cleaner, brighter, and dryer. Stock 'Superior' tubing, (packaged for your convenience) and be assured of uniform wall thickness for strength, and easy bending for installation ease.



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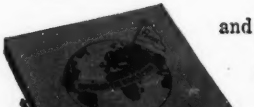

The revolutionary Papco #400 flaring and #500 cutting tools have made all other tube tools obsolete. You'll want the complete kit. For colorful literature on 'Superior' tubing and Papco tube tools, write: BOTTLED GAS DIVISION, Penn Brass & Copper Co.

TUBING HAS TO BE GOOD TO BE 'SUPERIOR'

PENN BRASS & COPPER COMPANY

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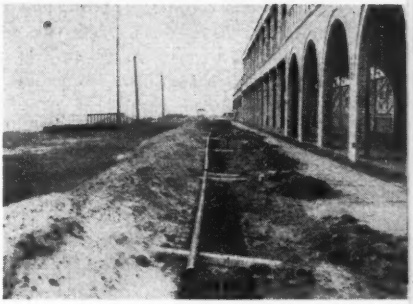
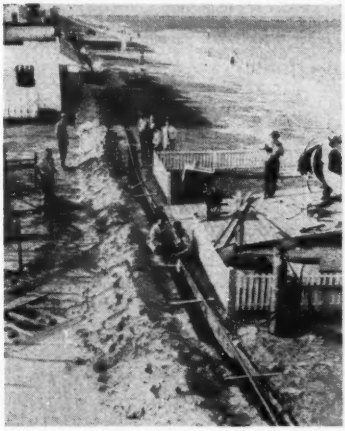
ABOVE: View of copper main before laying at Virginia Beach, Va. Note length made up above-ground. BELOW: At left, without hat, is Wallace Clark, president of company. In group of four appears Raymond Cassett, former president. Now owner of Tidewater Gas Co.





Laying Copper Mains For a Town Plant In Virginia

By ED TITUS

AN unusual town plant system in which commercially pure propane vapor will be piped through more than 10 miles of copper (and some red brass) mains, is nearing the point of service to consumers at Virginia Beach. The gas will be of 2520 Btu value.

Use of copper for the mains was carefully studied and found economically advantageous by those behind the project. Because of this and other unusual features of the Virginia Beach operation, it is well worth study for its possible influence upon the industry. It is also of interest for the possibilities it suggests for a substantial growth in the market for copper and brass in connection with LP-Gas operations.

In addition to use of copper mains, a few interesting features of the Virginia Beach operations are:

1. Service connections are novel in design.

2. "Silbraz" joints made with "Walseal" fittings are used.

3. Current plans call for a regulator system new in design.

The pipe gas system is designed to replace, for those within reach

of the new copper mains, the bottled gas which has been the principal fuel for cooking and for considerable heating for a number of years in this resort community. Virginia Beach has an all-year population of 5000 which jumps to about 35,000 at the height of the summer season. The project is that of the Virginia Beach Gas Corp., of which Wallace Clark is now president.

The project was given original impetus by Raymond A. Cassett, former president of the Virginia Beach Gas Corp., who also is owner of Tidewater Gas Co., "Pyrofax" distributors.

Reasons for Selecting Copper

Studies preceded the decision to use copper mains. The plan originated during the war, with steel pipe practically impossible to get. Possible corrosion and pitting of steel were considered, meaning replacement at some time in the future. If steel pipe were used, one engineer advised propane-air rather than commercially pure propane, because it was felt leaks which might develop in future years would be more costly with pure propane.

The thought occurred that copper might be the answer to the line loss problem, although on the face of it, it appeared copper would be much more expensive to install.

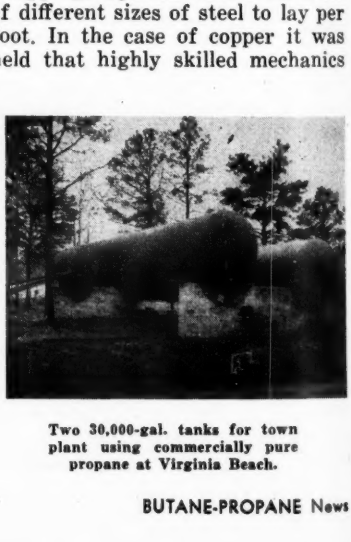
The Virginia Beach group talked with various members of the American Gas Association. The Walworth Co. furnished the fittings and valves for the project. Chase Brass and Copper Co. supplied pipe.

Because of the salt water condition, those in Virginia Beach were especially worried about corrosion, but became convinced that copper would not present a problem in this respect. They satisfied themselves that in copper lines it would be economically practical to use commercially pure propane.

This was desirable because commercially pure propane was used for appliances at the beach serviced by bottled gas, and conversion therefore would not be necessary.

Conversion costs would run high in the all-gas hotels and restaurants. The money that would be saved by not converting would be allocated to the extra cost of putting in copper, in case the overall cost of materials and labor for a copper system did prove to be greater than steel.

A check was made into cost of a steel system, including welding and wrapping. Opinion varied on costs of different sizes of steel to lay per foot. In the case of copper it was held that highly skilled mechanics



Two 30,000-gal. tanks for town plant using commercially pure propane at Virginia Beach.

Putting the dirt back over main that has been laid in space between hotels and boardwalk at Virginia Beach. This line is planned to transmit commercially pure propane.

would not be needed to make Silbraz joints.

After repeated attempts, it was found copper could be had, together with the necessary fittings, while steel at the time was projected nearly two years into the future. The opinion was expressed, after studies, however, that had both been available the decision still would have been in favor of copper.

The cost of labor in installing the mains at Virginia Beach is understood to have been about 30 cents a foot. This included digging, handling, brazing, testing and backfill. Most digging was done by hand, but some with a mechanical ditcher.

The engineer decided on the size of the copper mains and laterals as 3½ inches, 2½ inches, 2 inches and 1¼ inches. It was decided that copper mains with walls thinner than would be advisable with steel, could be used, and a further saving was effected here due to smaller outside diameter pipe adding approximately the same inside capacity.

A total of 10½ miles of pipe was needed to complete the mains and laterals. This was available before a start was made on the job.

The problem of where to place the mains caused considerable concern. The main artery of the community is a north-and-south state highway parallel to the beach and would be expensive and inconvenient to tear up. The space between the curb and the sidewalk was filled with electric and telephone lines and other materials creating problems.

A solution was found through running a 2½-inch main along an area designed for but not actually used as a street, between the hotel fronts and the boardwalk.

From this main along the beach it will be possible to reach all the beach-front hotels. Another main—a 3½-inch one—was run north and south, one block west of and parallel to the state highway. Lateral lines were placed on east and west streets at right angles to the highway, to pick up various restaurants, rooming houses and hotels. Other laterals were run west, sized to take care of future developments. All of the 10½ miles of mains were installed and covered up within 10 weeks.

The main being laid from the bulk plant to connect with the mains in the town is 3½ inch. Half-inch pipe is planned for house services, with some larger pipe, when needed for commercial establishments.

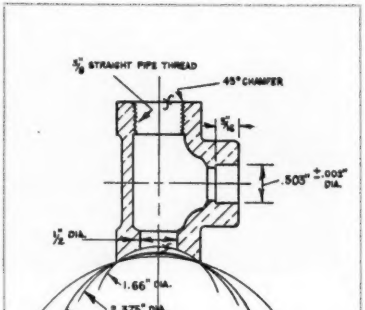


Fig. 1

An entire block was purchased for location of the storage facilities, and a railroad siding was installed to accommodate three cars. Two 30,000-gallon storage tanks arrived and were placed in position. It was planned to tie in the control room and the master meter at a later date. It is said four more 30,000-gallon tanks can be accommodated when and if needed.

A survey indicated approximately 800 connections could be made soon after gas was actually placed in the line. An order for 800 Number 922 Fisher regulators was placed with Fisher Governor Co., together with an order with Pittsburgh Equitable Meter for 800 of their 00 aluminum-cased propane meters.

At this writing, the mains in the distribution system have been completed and the main connecting this system with the plant is being laid. The entire system was tested at 125 pounds pressure holding overnight. The two 30,000-gallon tanks are in place, and the railway siding completed. Service connections have not been made, and the new management of the company has made no statement as to what, if any, changes will be made in the original plans for control room, etc., at the plant. What follows describes what was originally planned, and is presented here as being of interest, regardless of whether it conforms exactly to what is eventually done. Plans may be changed, due to various factors, as the project moves to completion.

The system was designed for individual regulators for each installation. It would therefore be possible to increase the 12-pound designed pressure at the extreme end of the line as much as desired, depending on demand.

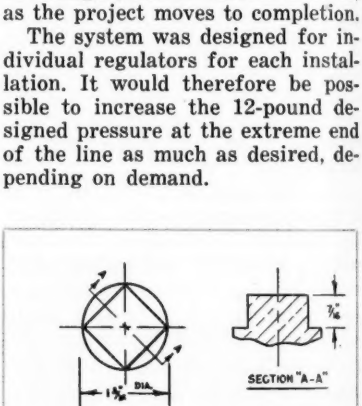


Fig 2

A new high-pressure manifold hook-up was planned, employing four Fisher regulators, one regulator to be used in the service between the tank pressure and the main send-out. In the event of failure of the first one, which would carry a setting to distribute 12 pounds at the extreme end of the line, the second one would automatically cut in when a 2-pound drop had occurred. Similarly, the third and fourth would cut in if needed.

The plan was calculated to make it possible to remove any one of these regulators, should it become necessary, without interruption of service.

Arrangement of Control Room

Unlike most layouts in control rooms, these manifolds would be placed parallel to a backwall, and would require very little space in the room. It was planned to connect the tank to a Brunner compressor located within a climb-proofed fenced area with additional connections running to a sealed pit where tank car unloading hoses would be connected. These lines running from the compressor to the pit would be heavily insulated and placed underground.

The next problem was that of connections of house services to the mains and laterals. This was considered very seriously prior to making the decision to go to copper lines. A question was brought up as to whether or not it would prove necessary to install tees, locked off at each house that was passed, because some day the occupants might desire to have gas. This would have entailed an additional very large investment. But representatives of Fisher Governor and Walworth came up with the idea of doing entirely in reverse what is usually done in connecting home services. They suggested that the connection be started at the house, that the meter be installed, then the regulator, then the valve. Then it was proposed to run a ½-inch O. D. Type K soft copper tubing underground back to the location of the main or lateral, the tubing to be cut at this point at the required length to silver braze it into the side opening of a special tee (Fig. 1) concaved to fit the size of the main or the lateral to which it would be connected. The soft tubing is first brazed into the opening of the tee. Then the tee is placed on the main or lateral, after it has been properly cleaned and fluxed, and held there by a spring clamp. A small ring of "Easy Flo" is dropped down through the top opening of the tee and then heat by means of an acetylene torch is applied to the pipe, causing the "Easy Flo" ring to melt and make the tee adhere to the pipe.

It is stated that tests have proved it is next to impossible to break the joint, and that the pipe will break before the joint will break. It is said the operation can be performed with gas in the line with no hazard unless a man holds his torch too long at any one point, causing him to burn through the pipe.

After the joint has cooled, a small male threaded bushing is screwed into the open top of the tee and a drill is inserted and a hole drilled in the pipe, allowing

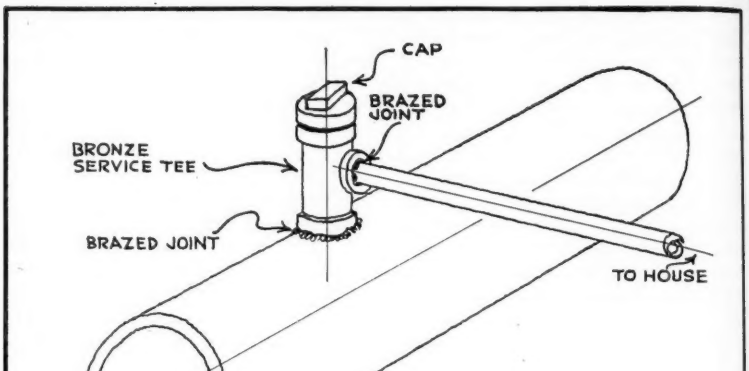


Fig. 3

the gas to come through the opening to the house connection.

The drill and bushing are removed, and a cap (Fig. 2) having a neoprene gasket is then screwed over the opening, thereby losing a very small amount of gas in making the connection and not making it necessary to cut off service in any particular block. This completes the assembly as shown in Fig. 3.

The question has arisen as to what would be done in case of fire.

In a home or hotel where the meter and regulator were attached to the structure, very soft copper tubing having been used, this could be very easily dug out and crimped at any one point, to prevent the gas flow from igniting.

And when the service was to be reinstated, the cap would then be removed from the top of the tee, and a sponged bushing would be put in its place, cutting the service off entirely. It would then be possible to work at restoring the line at will.

No Frost Below Six Inches

Climate at Virginia Beach is such that there was no fear of a frost line. It is said frost has never gone below six inches. Twenty-four to 30 inches cover, however, was placed over the pipe. This would

serve as protection against such hazards as trucks passing over the lines.

Use of bottled gas in Virginia Beach has grown rapidly, particularly commencing with the war. It is expected that the transition from this bottled gas to pipe gas of the same kind and same Btu will not be too difficult. No statement has been made as to what the rate system will be. But it is expected to be on a cubic foot rather than on a therm basis.

In addition to typical 2-cylinder installations in homes, there are larger ones in hotels and restaurants. Many serve for cooking and water heating all year, and often for heating in winter. One hotel has an installation of 24 cylinders. In addition, some establishments are served with tanks.

One hotel has seven "Safaire" heaters. Others have unit heaters, or forced air furnaces. Floor furnaces also are popular.

In competition with coal and oil, the greater cleanliness of propane often is cited.

During the war, a tremendous influx of service personnel, seeking a place to live, almost overnight turned Virginia Beach from primarily a summer resort to an all-year community. New and old residents required fuel. With knowledge that one day in the not-too-distant future someone would realize the possibilities of pipe gas, in what had been a town but was about to become a small city, the services of an engineer were engaged to make a careful survey. This was followed by an application to the town council for a 30-year exclusive franchise for gas utility operation; also, to the Princess Anne county supervisors for exclusive permission to extend the Virginia Beach lines north and south and west into the county. Both applications of Virginia Beach Gas Corp. were granted. It is hoped to serve 800 to 1000 meters in Virginia Beach, and the figure may go to 2000 with the surrounding county territory.

The operation of the new gas service, when it is established, will be watched with interest by both the butane-propane industry and the gas utility industry.

Cylinder loading platform at Plank's Home Center in Hollidaysburg, Pa., and (at right) reproduction of card which tells prospective customers how to reach headquarters.

Should Small Dealers Advertise?

Definitely Yes, Says Eastern Dealer Who Tells How He Made It Pay

DOES it pay for a small gas dealer to advertise extensively? What form of advertising should a small gas business use? These were the two questions facing William H. Plank, the managing owner of Plank's Home Center in Hollidaysburg, Pa., last fall when he started to distribute "Happy Cooking Metered Gas" in Blair county.

Luckily, Mr. Plank had a wealth of experience in other lines of business to draw upon in answering the two questions facing him. He had been a successful automobile dealer for 10 years and following the war had opened a high class appliance store to which he added the distribution of "bottled gas" in September, 1947. The wide acceptance of "Happy Cooking Gas" in Blair county after one year of

promotion proves unmistakably that the advertising methods used by Plank's Home Center pay big dividends.

The program followed by Plank's Home Center is of particular interest to LP-Gas dealers seeking the same ends. Here is what has been done:

Every form of advertising was used from the very beginning of the operation. First, a series of newspaper ads were prepared. These were introduced with a "personal touch." Actual photographs showing the arrival of a truck load of cylinders with an explanation of how important these tanks were in installing "Happy Cooking Gas" started the campaign. Another showed a truck load of stoves arriving at the Home Center. Another, the service truck with the servicemen loading the truck to go out on an installation. All this gave the gas service a very personal atmosphere.

A series of large 24 sheet billboards were installed throughout the county. These ran for three months with several strategic boards continuing for the year. The billboards primarily did one job and that was "sell" the trademark "Happy Cooking Metered Gas Service."

Dealers are probably only as successful as they strive to be. Those who conduct aggressive advertising and sales programs gain ground fastest.

At least one may well judge this to be true from the pronounced success that has attended the operations of William H. Plank who, in less than one year, has built up his distribution of LP-Gas and appliances to cover the entire county in which he operates from his headquarters at Hollidaysburg, Pa.

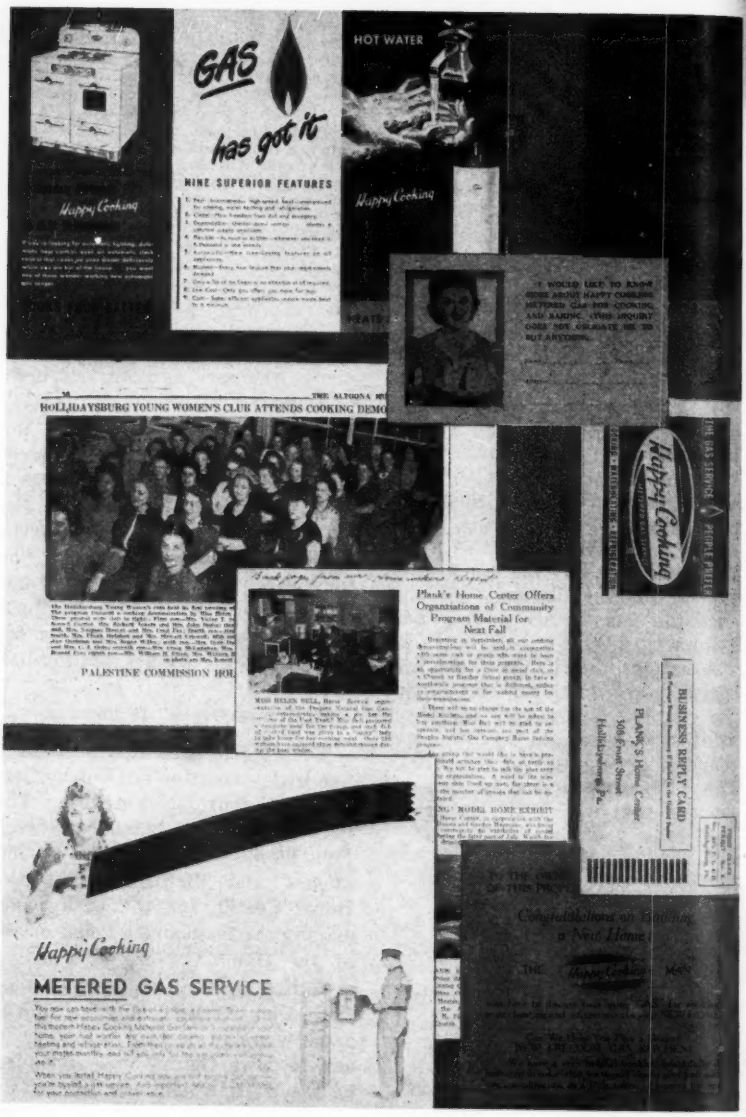
What Mr. Plank has done may be easily accomplished by other dealers. Read about his methods and adopt such ones as you choose.—Editor.

Direct mail played a very important part in letting the people of Blair county know there was a new gas service available. Mr. Plank made an extensive survey to determine how many, and who they were, who were not using gas in their homes. He put all those not using gas for cooking on his "Homemaker's Digest" mailing list.

"House Organ" Is Popular

The "Homemaker's Digest" is a fine little magazine put out by Servel, Inc., four times a year. The back page is left blank by Servel. Mr. Plank works up interesting stories and pictures about the Home Center for the back page, making the magazine a house organ of the Home Center. This magazine has become so popular that those who see their neighbor's magazine write in or visit the store to ask to have their names included on the mailing list.

WILLIAM H. PLANK


Happy Cooking
GAS
has got it
NINE SUPERIOR FEATURES
HOT WATER
Happy Cooking
I WOULD LIKE TO KNOW
MORE ABOUT HAPPY COOKING
HOLLIDAYSBURG YOUNG WOMEN'S CLUB ATTENDS COOKING DEMO
PALESTINE COMMISSION HOL
Plank's Home Center Offers
Organizations of Community
Program Material for
Next Fall
PLANK'S Home Center
506 Front Street
Hollidaysburg, Pa.
BUSINESS REPLY CARD
Happy Cooking
METERED GAS SERVICE
Congratulations on Building
a New Home

Billboards are located in rural areas to attract farmer trade. On opposite page are some of the many forms of hand bills, post cards, and publicity used by Plank's Home Center.

To supplement the "Homemaker's Digest," three direct mail pieces were prepared and mailed to every rural box holder in the county. Each mailing included a postage-paid return card. Seventy-five hundred pieces went out at each mailing. The return cards kept the salesmen busy following them up, for the response was most gratifying. Mr. Plank emphasized the importance of enclosing a return card to get the most returns from the mailing.

Radio was used to tell the story of "Happy Cooking Metered Gas Service." A 15-minute program, featuring Louise Massey and the Westerners, was run on one of the local radio stations for three months. Following this series of programs, spot radio announcements were used on two local stations. At the Christmas season a special 15-minute Christmas program was run each week with the commercial playing up the idea of a new gas range and "Happy Cooking Gas" for a Christmas gift. This resulted in quite a few sales.

Another promotional program that brought big returns was a series of cooking demonstrations. A demonstration kitchen was installed in the showroom of the Home Center with a range, Servel gas refrigerator, and a sink, all in operation. A home economist from the local high school was employed to put on cooking demonstrations. She prepared a complete meal for the group and at the close of the program each dish was given to some attendant, selected by lot, to take home.

Civic, social and church groups from all over the county were invited to arrange parties. From 30 to 40 women could be accommodated at a time. Following the demonstration refreshments were served to the group. Ample opportunity was always given the ladies

BUSINESS-GETTERS

Newspaper advertising.
Billboards.
Direct mail.
House organ.
Radio features.
Radio spot announcements.
Cooking demonstrations to women.
Cooking demonstrations to men.
Newspaper publicity.
Good customer relations.
Free cook books.

to look around the Home Center, but a hard and fast rule was never to sell anyone anything. In all the advertising for demonstrations it was clearly stated that no one would be asked to buy anything.

The demonstrations became so popular the local Kiwanis Club asked if they might have their meeting at the Home Center and have a demonstration for a program. With the cooperation of Mrs. Plank and the office girls a buffet supper was served followed by a special demonstration so that the whole club went home all enthusiastic over gas cooking.

Demonstrations were one way of getting a lot of fine, free publicity. The local newspaper was given a photograph of the group with all their names and they featured the picture and story on the women's page—publicity that money could not buy.

Another publicity stunt used by the Home Center to focus attention on it as headquarters for home planning was to show two of the "Better Homes and Garden" magazine's model homes for three days. Large ads were run in the local papers inviting people to see the houses. There was no charge and large groups visited the showrooms to see the houses and in turn learned more about Plank's Home Center.

No opportunity was ever overlooked to display the name "Happy

Usually women try to sell their husbands on the idea of new gas ranges, but it is a safe bet that the members of the Hollidaysburg Kiwanis club, pictured above, reversed the process after witnessing a cooking demonstration by the local LP-Gas dealer. It was just another publicity stunt of Mr. Plank's but it paid off big.

Cylinder truck loaded for customer delivery.

Cooking" where there was a crowd of rural folks. At fairs, community picnics and organization celebrations, exhibits were set up and gas installations were installed at the refreshment stands with large signs urging people to "Eat Delicious Food Cooked with Happy Cooking Gas."

Another means of securing prospects was the contacting of "Happy Cooking Gas" users. About a week after a new gas installation was made a representative called to see if everything was satisfactory and incidentally to learn if any of the neighbors or friends were interested in having gas installed in their homes. This brought a good many "hot" prospects. A very fine cook book was offered to any gas user turning in a prospect (that was sold). Everything was done to make the gas users satisfied customers and boosters for the company.

Mr. Plank is convinced that well planned advertising and promotion is just as valuable for the small dealer as for the large one, and his experience has definitely proved that this has been so in his case.

Small Containers Must Be Filled by Weight Only

The importance of filling 100-lb., or smaller, cylinders by weight only is stressed in a recent LPGA bulletin as follows:

In addition to being unsafe, the Interstate Commerce Commission and various state regulatory bodies have decreed that it is illegal to fill or transport cylinders that have been filled without the consent of the owner.

It cannot be over-emphasized that extreme care and caution must be used in the filling of small containers. The following table gives some indication of the possibilities:

Container	½lb overfilled	1lb overfilled
100 lb	.5 % overfilled	1% overfilled
20 lb	2½% overfilled	5% overfilled
10 lb	5 % overfilled	10% overfilled
5 lb	10 % overfilled	20% overfilled

Since the vapor space in an LP-Gas container, storing propane, is usually slightly under 20%, it can be readily seen that the overfilling of a small container gives much more cause for concern than the overfilling of a larger container. Also, all such small containers should be filled by weighing rather than by fixed liquid level dip tube.

It is illegal for ICC containers having approximately 80 lbs. net capacity or less to be filled by the use of fixed level devices. Therefore, it is required that all the smaller ICC containers be filled by weight. However, there are many small non-ICC containers that have replaceable fixed level devices installed. These devices are usually referred to in filling instead of checking by weighing. Experience has taught that the replaceable type fixed level gauge, because of its replaceability, cannot always be depended upon. In the replacement process, inaccuracies frequently show up, which are nearly always on the overfilled, or unsafe side. Therefore, all small LP-Gas cylinders should be filled by weighing only.

Producer Installing Huge LP-Gas Storage

WARREN Petroleum Corp., Tulsa, has announced that it has started construction of four large LP-Gas storage terminals at strategic points in its marketing territory as a part of its program to conserve seasonal excess production for ready distribution in periods when current output is inadequate to meet peak demand.

The four terminals will have a total of 160 high pressure tanks of 30,000 gallons capacity each, representing a combined capacity of 4,800,000 gallons of propane or other liquefied petroleum gases.

The locations of the terminals and their capacities are as follows:

Mobile, Ala.....1,800,000 gallons
Little Rock, Ark.....1,440,000 gallons
Des Moines, Iowa....960,000 gallons
Cedar Rapids, Iowa..600,000 gallons

The terminal at Little Rock is expected to be in operation by Sept. 1, and the other three will be ready for use before the usual winter peak demand period arrives. One or two additional sites are reported under consideration for installation of additional terminals later this year.

One Producer's Share

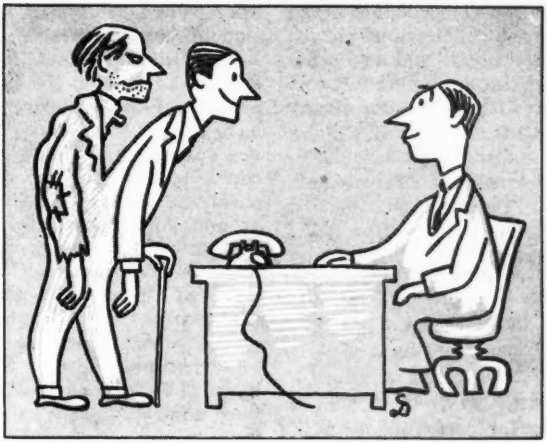
"These terminals are one producer's share of the storage that the entire industry—producers, distributors and consumers—need and must have if we are to wipe out our seasonal periods of feast and famine," G. L. Brennan, general manager of Warren's LP-Gas division explained. "Only by conserving every gallon possible of excess production in the future can we hope to cushion the impact of peak demand periods when current production invariably becomes inadequate."

Brennan explained that each terminal will be operated for the benefit of all of Warren's distributors in the territory which can be supplied from it. "These terminals not only will enable us to give better service to our customers," he said, "but also will permit us to utilize more efficiently transportation facilities. We can move excess production to storage in periods when demand on transportation facilities is not heavy, where it will be immediately available to all distributors in periods of peak demand by truck movement when transportation facilities are being taxed to the limit."

Past Experience Speeds Results

The fact that the first terminal was started only last June and that all of them will be ready for service this winter is due, it was said, primarily to the fact that Warren has received complete cooperation from tank manufacturers, equipment suppliers and all state authorities; also, because Warren's engineers acquired the "know-how" of large terminal installations through experience in constructing terminals at Norsworthy, Texas, and Newark, N.J., for use in connection with the propane tanker "Natalie O. Warren."

When these four projects are completed Warren will have approximately 12,500,000 gallons of LP-Gas storage at its various terminals, in addition to several million gallons of storage at its various manufacturing plants.



The ABC'S of Good Credit Risks

DOING business on credit has, for many merchants, been a difficult phase of their total business operation. When money is plentiful and merchandise is scarce, the consumer will pay, but when merchandise is plentiful and money is scarce not all customers will pay promptly, and a certain percentage will not pay at all.

During the depression years many merchants firmly believed that there was no successful method of doing a profitable credit business. They could point to their ledgers and to their past-due accounts as evidence. Still, during those same years, successful merchants were doing a profitable credit business with only nominal losses.

There must have been a reason for the failure of some and a reason for the success of others. If we analyze the situation closely, I think we will find that the successful merchant adopted a sound credit policy. His procedures were laid down; they were time-tested and proved to be successful methods,

By PLASCO G. MOORE

Assistant State Supervisor, Distributive Education, State Board for Vocational Education, Austin, Texas

Speech delivered at the Third Annual Convention of the Texas Butane Dealers Association, Austin, Texas.

whereas other merchants had adopted no set policies, but viewed each new credit applicant as a separate and distinctly different problem to solve without the aid of any set procedures.

Personal Attributes That Often Mislead

Appearance
Friendship
Character
Conversation
Social Standing
Honesty

His bases for accepting a credit applicant were probably one of many different bases upon which he could accept or reject an applicant. He might have based his credit extension on the *appearance* of the applicant. If he looked good, dressed well, and talked convincingly, he would sell him.

He might have considered *friendship* as a basis for extending credit. If the applicant was a friend of his could he afford to turn him down? He could and probably did sell him because he was a close personal friend, or a friend of his family. On the other hand, the merchant might have extended the applicant credit on the basis of *character*. Knowing something about his affiliations with church, civic and other organizations, and considering his local reputation of being a "fine fellow," he might have sold him because he thought the man was of good character. But then we ask ourselves: What is character? Do all people of good character pay their bills? The answer will depend upon our definition of character.

Still the merchant might have extended credit on the basis of the *honesty* of the applicant. He might have known that the applicant was never caught stealing, he had no court record, he never tried to cheat in sports, he was an all-around good fellow and he had a reputation for being honest. Yet when we view the credit records of a lot of "honest" people we find that while they may have many of the virtues of an honest person, we sometimes find that they do not have a very good credit record; that they have not always paid their bills promptly, and that they may not have paid some of their bills at all.

The merchant on the other hand might have extended credit to an applicant on the basis of his *social standing*, knowing that the applicant lived in the "big white house" that he was a member of the local country club, that his name often appeared in the paper in connection with social events—all of these things might have persuaded him that the applicant was a good credit risk. Yet, there are many people who have a high social standing who do not pay their bills.

The merchant might have extended credit on the basis of the *ability of the applicant to pay*. He might have considered that because the applicant was apparently financially well off, because he owned an expensive automobile, because he had a nice home and apparently had an above-the-average income, that he was a good credit risk. And yet, we know of a lot of people who

make a great deal of money but who do not have good credit records.

What then, we might ask, is a sound basis for the extension of credit?

The Best Criterion: Reputation as a Payer

The answer, I think can be found in the points mentioned previously but we cannot extend credit on any one of these points, alone. We must consider all of them, in addition to one final consideration, and that is the applicant's *reputation as a payer*. If a man is honest, if he has a good social standing, if he is of good character, if he has the ability to pay, and if he has a good credit record (a reputation of having paid his accounts in the past), everything else being equal, we have a pretty good right to believe that he will pay his accounts in the future.

But if he has all of the points mentioned above, with the exception of a good reputation as a payer, then we have very little right to believe that the man will pay us if he has not paid others.

Obviously we cannot look at a credit applicant and know whether or not he is a good credit risk. We can talk to him and perhaps be able to make up our mind a little more definitely, but still that is not a sure way. Is there a sure way?

For our answer we can point to successful credit firms, both large and small, which have found a sure way of doing business on credit. Not that these firms do not lose a little on their credit transactions, but the amount of their loss is so small compared with their total volume that it actually cannot be considered to be much more than the average loss sustained in doing a cash business.

These firms which have been successful in doing a credit business have based their credit policy upon six major points.

These points are the ABC's of conducting a successful credit business. They are not new—they really are elementary, but being elementary, so many merchants have overlooked their value. Some merchants have skipped a lot of steps

Plasco G. Moore

and plunged into a credit business that flourishes when times are good but eats into their profits when times are bad, and even has, and will, contribute to business failures.

What To Do

Take a credit application
Make an investigation
Get history of applicant
Check with local credit bureau
Determine if applicant is buying beyond his means
Acquaint him fully with your credit policies

The first requirement in doing a credit business is to *take credit application.* In other words, get the information about the applicant before you consider selling him. Have a printed application form. Hardly any potential credit customer will object to a reasonable line of questioning if it is done in the proper manner. A complete credit application will reveal the necessary information required to enable a merchant to make a sound credit investigation; and that requirement brings us to requirement No. 2, which is:

Make an investigation. Have a credit policy which requires that before a customer is extended credit an investigation is made of his credit standing. Get a complete history of the applicant. From your local credit bureau you should be able to determine how the potential customer has paid his bills, not only during the last few months or years, but during his entire lifetime as a credit customer. You will be able to determine how much he has bought in the past, whether he paid promptly, whether he was slow and whether or not he had merchandise repossessed. You will be able to determine a lot of other good things regarding the customer's paying habits not only in the town in which he now lives but in the cities where he previously lived.

You will know more about the type of work he is doing, how much he is earning, and how much he owes now. And this brings us to requirement No. 3:

After you have gotten the information, after you have made the investigation, *carefully evaluate your credit customer.*

From the investigation you will learn whether or not he is paying others. If he is paying others now and if he has paid others in the past, then you have reasonable assurance that he will pay you. You will also be able to know and you should weigh very carefully how much the customer is obligated for in other firms.

Is he buying too much? Will this sale over-obligate him? If the customer is a good credit risk then you will want to accept him as a credit customer, and this requirement No. 4:

Use the *correct procedure in accepting a new credit customer.* This procedure, of course, will vary with the type of business you are operating, but the general principles, I think, are the same. Be sure the customer understands your credit policy. If it is an open account, be

"I'm filling Junior, papa."

"Bless his little heart. So round . . . so firm . . . so fully packed with gas. Yet never a whimper!"

"Just like dad! He's going over to keep the Murphys' hot plate hot."

"A real Autoweld, mama. The cash-and-carry kid. No wonder everybody wants him, come vacation time."

"What do you mean, vacation time, papa? Little Four-Pounds and brother Six-Pounds got themselves friends in the plumbing and sheet metal business, too!"

"Gad — Autowelds to the core!"

Autoweld Cash-and-Carry "baby" bottles sell big all-year-round. Very light in weight, compact. Available in 1 gallon (tare weight 7 lbs.) and 1½ gallon (tare weight 11 lbs.) sizes. Made to I.C.C. specifications. May be filled conveniently from any of the larger Autoweld bottles. Write for information on the complete line. Autoweld makes quality lightweight bottles for every purpose.

AUTOWELD CORPORATION

852 W. WHITTIER BOULEVARD • WHITTIER, CALIFORNIA

sure that he understands that his account is due and payable in 30, 60 or 90 days, depending, of course, upon the length of time you extend your open credit accounts. This information can be gotten over to your applicant either in conversation with him at the time you thank him for his business, or it can be given him in a "welcome letter" which you can send to all your new credit customers.

What the Letter Might Say

This letter might read in part something like this:

"Dear Mr. Jones:

"Yesterday we had the privilege of opening a convenient Smith Bros. charge account for you. We want you to know that we appreciate your choosing our firm as the place for doing your business.

"We want you at all times to take full advantage of the services we offer and to let us know when we may be of additional service to you.

"A monthly statement of your purchases will be mailed you on the first day of each month. Your bill is due and payable on or before the 10th of each month. You may bring your remittance direct to our office, or if it is more convenient, you may mail it to us."

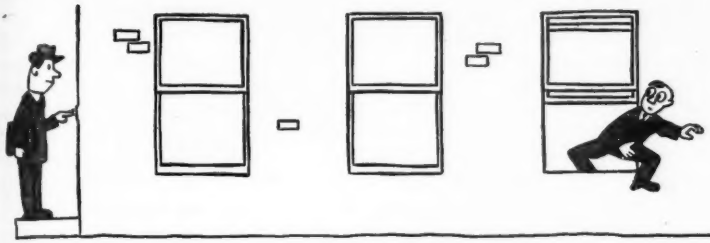
Such a letter serves a two-fold purpose. It shows the appreciation of the store for the customer and at the same time it tactfully gives some major points in the store's credit policy which may at a later time prove to be very beneficial to that store.

If the customer is not a desirable credit risk, then the store must reject him. This need not be a distasteful job at all. It does not mean that you do not want the customer's friendship; it simply means that you are trying to help the customer. If he is not a good credit risk he probably has some outstanding accounts which he has not been able to pay. If he has not been able to pay others, then you are doing him a real service by helping him not to further obligate himself for merchandise which he will not be able to pay for.

If you have the opportunity, you might counsel with the customer. In counseling with him do not tell him whom he owes or how much he owes, because this is confidential information. You should tell him, that according to the information received, his credit record will not permit you to open an account for him. Usually the customer will want to know "whom he owes" (knowing all the time whom he owes and how much he owes). At this point he should be told that you do not have all of the information, but if he would like to get a detailed report he can get it by going to the local credit bureau office.

Might Be Cash Customer

Express sincere regret that you are not able to sell him but that if he can get his credit record in good order you will be happy to consider him as a credit customer or you might suggest that you would like to sell him on a cash basis. Of course, this may not always work but at least it shows the customer that you are inter-



ested in trying to help him even though you cannot sell him on credit at this time.

For Delinquents

Follow up promptly all slow accounts

1. **By letter.**
2. **By phone.**
3. **In person.**

Point No. 5, I believe, is one of the most important requirements in doing a successful credit business. *Follow up with precision all slow accounts.* After an account becomes past due, don't wait too long to remind your customer that his account is delinquent. The average customer will not object to a courteous reminder. The first reminder should be courteous; in fact, all reminders should be courteous. But the first reminder will be mailed shortly after the account is in a past-due status, and if the account is not paid within a reasonable length of time, a second reminder should be mailed. If this one does not produce results, then a personal letter, a phone call, or a personal visit should be made. There is no rule so far as I know for the number of reminders to be mailed a customer before other collection efforts are made. Much depends upon what mechandise you are selling, the type of customer you are selling, and the type of business you are operating.

There is no rule as to the length of time which should lapse between reminders. One thing, however is certain: most merchants wait too long before making collection efforts. Some merchants wait until an account is 60, 90 or 120 days past-due, and then in a fit of anger or excitement they attempt to do about four months of their collection work in one day. The customer is not prepared for him, he does not know the merchant was concerned about his account because he had not received a reminder, and therefore, the collection effort is not successful.

There is another thing which will aid you in the collection effort and that is, when an account becomes past-due and collection efforts have been made without success, a good policy is to re-check with your local credit bureau the status of your customer's credit record. Find out what has hap-

pened since you accepted him. Is he over-sold? Can he pay you? Is he paying others?

Sometimes a re-check with your bureau will give you vital information upon which to base your collection efforts. Sometimes it will tell you that it is wise to wait and be patient with your customer. At other times it will tell you that you should proceed with all haste to collect the account or to get a note on the balance past-due, or to repossess the merchandise.

Advantages of Carrying Good Risks

They generally pay

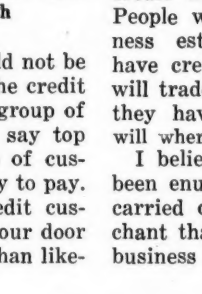
They buy more because of having credit

They trade longer with you than where they pay cash

Requirement No. 6 should not be overlooked. If you are in the credit business, go after the top group of credit customers. When I say top group, I mean that group of customers that have the ability to pay. Don't wait until your credit customers come knocking at your door to open an account. More than likely many of those that come in and ask for credit will not be "top" credit risks. But the customers you pre-select, those you seek out, and those on which you get a credit report in advance, and then solicit their credit business later—that group of credit customers will prove to be a profitable group.

If your prospects have unquestionable ability to pay, if they have a good credit record, and if you can hold their business by providing them with the kind of service they want, then that group of customers may be the difference between profit and loss on your ledger if a business recession should occur. Then go after the group who can pay and promote a high type of credit business with this group. People will buy more from business establishments where they have credit accounts. Also, people will trade longer with firms where they have an account than they will where they pay cash.

I believe the points which have been enumerated here, if properly carried out, will assure any merchant that he can operate a credit business successfully.



Central Plants

Safe Design and Operation

WHILE a large proportion of liquefied petroleum gas reaches the ultimate consumer in individually distributed "bottles" or tanks, there is another and a rapidly expanding means of distribution that requires consideration from the safety standpoint. This involves the distribution of the gas from central plants through pipe lines to consumers.

Central plants are being installed in new communities, in emergency housing projects which may be beyond the range of regular city gas distribution or in small towns which have never had a central gas plant. In such cases, the selection of the plant site and the lay-out of the distribution system is an entirely new project.

In other places central distribution of liquefied petroleum gas is completely replacing or supplementing existing manufactured or natural gas plants. In such cases the site of the plant is likely to be at the existing gas plant with distribution pipe lines already in place.

There are two general types of plants for distributing liquefied petroleum gas. In one type the gas is distributed undiluted, while in the other it is diluted with air to give a mixture with a heat value approximating that of manufactured or natural gas. It should be noted that in all instances the material is distributed from the plant in the gaseous state.

There are several reasons why liquefied petroleum gases are used in conjunction with manufactured or natural gas:

(a) The system may be installed as a standby in case of failure of the manufactured or natural gas supply.

(b) The gas may be added to the ordinary gas supply for enrichment purposes.

(c) The liquefied petroleum gas may be added at times of peak demand; otherwise it would be necessary to enlarge the gas manufacturing facilities.

In other cases a distributor of

This is the fifth in the liquefied petroleum gas series and the second concerned with utilization practices prepared by the Liquefied Petroleum Gas Research Committee of the National Conservation Bureau, New York City.

The titles of the preceding pamphlets, three of which have appeared in BUTANE-PROPANE *News*, are as follows:

Liquefied Petroleum Gas—What It Is—How It Acts.

Safe Operation of Motor Vehicles Transporting Liquefied Petroleum Gas.

Safe Motor Vehicles and Equipment for Transporting Liquefied Petroleum Gas.

Safe Use of Liquefied Petroleum Gas as Fuel for Automotive Vehicles.

The term "liquefied petroleum gases" means any product which is composed predominently of any of the following hydrocarbons or mixture thereof: propane, propylene, butanes (normal butane or isobutane) and butylene.

manufactured gas may change over to liquefied petroleum gas, utilizing as much old plant equipment as possible, usually including old pipe distribution lines.

Approval for a central distributing plant should be obtained from the authorities having jurisdiction over the site, plans and specifications.

All equipment should be installed in an approved manner and under the supervision of some one experienced in the use of liquefied petroleum gas.

The various problems will be considered under five headings representing five stages in the operations involved, namely, Liquid Storage, Vaporization, Mixing, Gas Storage and Distribution.

LIQUID STORAGE

Site:

1. In the case of an area to be newly served, the selection of the site of the central plant will require careful consideration. The site chosen should contain the entire plant, including liquid storage tanks, vaporization equipment and gas storage facilities. Unless the liquefied petroleum gas is received by pipe line, either a railroad sidetrack or a vehicle roadway must be available. Preferably, it should be served by both to ensure delivery if service from one of them is interrupted.

The safe location of the storage tanks will govern the selection of the entire plant site. For economical distribution, the site should be as close as possible to the center of the area to be served, but away from congested areas. A site lower than the surrounding countryside and in particular, lower than nearby roadways or railroads is generally preferable.

The National Conservation Bureau is dedicated to the safety of men, women, children—wherever they may be, whatever they may do.

It serves as the accident prevention division of the Association of Casualty and Surety Executives, and is supported by the more than 60 leading capital stock casualty insurance companies which maintain the Association.

2. Because of the pronounced volatility of liquefied petroleum gas, dikes are not normally necessary. However, in the case of large storage in congested areas, diking is recommended.

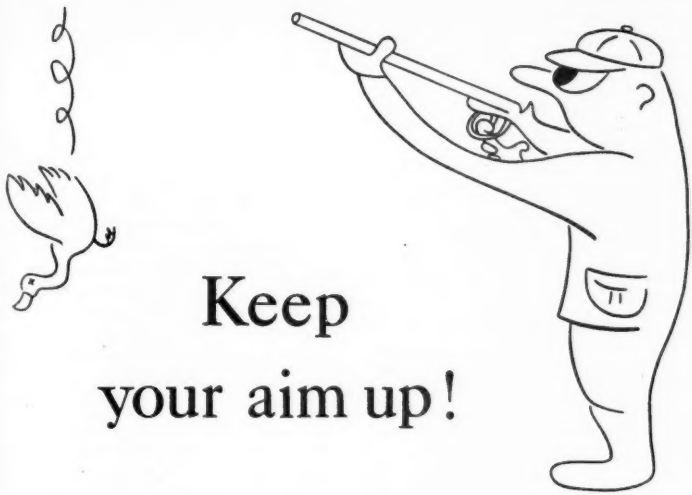
3. Storage tanks and regulatory equipment should be located at least 50 feet from buildings and adjoining property lines, except buildings that are devoted exclusively to gas plant operation.

4. Sidetracks should be located as specified in Section 4 of Circular No. 17B of the Association of American Railroads. In general, these regulations relate to allowable distance of the sidetracks from the main railroad track, proper precautions to be observed when unloading, the laying of pipe lines on railroad property, connections between tank cars and pipe lines, and artificial lighting requirements.

5. When a central distribution plant is to be installed in connection with an existing manufactured gas plant, the site will usually be fixed by the location of the old gas plant. However, when the old gas plant is in a congested neighborhood, consideration should be given to moving the liquefied petroleum gas installation to a less congested area even though this may necessitate the laying of an appreciable amount of new piping.

Tanks:

6. The storage vessel should be constructed according to municipal and



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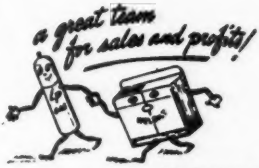

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state requirements, if any, as well as either the Unfired Pressure Vessel Code of the American Society of Mechanical Engineers or the American Petroleum Institute—American Society of Mechanical Engineers Code for Pressure Vessels.

In addition, all tanks should be equipped with a manhole for inspection purposes. The buyer should deal with a reputable manufacturer who will guarantee construction of the vessel according to legal and code requirements. The tank should be designed for a working pressure of 250 pounds per square inch.

Inspection:

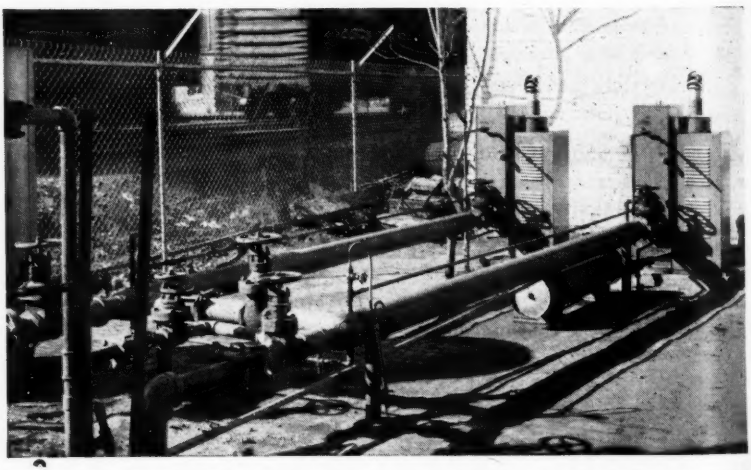
7. The storage tank, like all pressure vessels, should be inspected periodically. External inspection should be made at least annually by a qualified inspector. Internal inspections should also be made when required by regulations or as indicated by other conditions. In addition, a competent employe should make daily inspections of the tank and piping. Before internal inspections are made, the tank should be purged according to the procedures described in the "Handbook Butane-Propane Gases."

Tank Supports:

8. Regulations regarding tank settings will be found in NBFU Pamphlet No. 58, Section entitled "Installation of Storage Containers." In general, the container should be mounted on saddles so secured as to allow for expansion and contraction. The saddles should be fire resistive and so arranged as to prevent the concentration of excessive loads on the supporting portions of the tank shell.

Piping and Fittings:

9. Piping and fittings should be wrought iron, steel or copper or approved gas tubing. When hose is used, it should be resistant to the solvent action of liquefied petroleum gas. Cast iron pipe and fittings should not be used. The storage tank should be fitted with one or more pressure relief valves of sufficient relief capacity to



Gas-air installation at Lawrenceburg, Ind., showing gas-air mixing machines.

take care of any excessive pressure due to over-filling, temperature conditions or the use of a product of a higher vapor pressure than originally contemplated. Definite data on piping and fittings and on sizes of relief valves can be found in NBFU Pamphlet No. 58.

Unloading:

10. At least one man should stand by the tank car or truck for the entire unloading period. The rate of unloading should not exceed the maximum flow for which the excess flow valve is set to close.

Filling:

11. Before filling storage tanks, the gauging devices should be checked, set and/or otherwise readied for properly indicating the quantity of liquid in the tank.

Filling operations should be stopped as soon as the gauges indicate the liquid has reached the level for the filling density of the tank.

For information on filling densities, refer to the first pamphlet of this series, "Liquefied Petroleum Gas—What It Is—How It Acts," second edition and the tables of the Interstate Commerce Commission and the National Board of Fire Underwriters Pamphlet No. 58 and other pamphlets in this series.

Fire Protection:

12. All portions of the system should be electrically grounded. The resistance of the ground should be not more than 5 ohms and the resistance should be checked periodically. During unloading operations, the tank car or truck and the storage tank should be electrically bonded. Approved fixed and automatic fire extinguishing devices should be provided for, preferably of the water fog type (if the necessary water pressure is available) with heads so placed that the entire tank area will be blanketed with fog in the event of fire. In addition, hose and standpipe fire-fighting equipment, preferably of the fog type, should be available.

VAPORIZATION

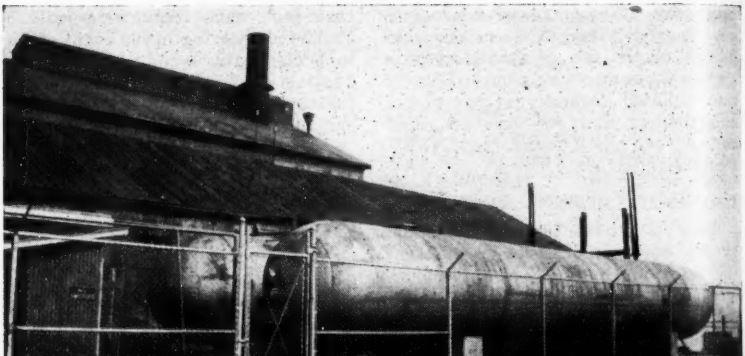
Types of Vaporizers:

13. The processing step in central plant distribution generally begins with vaporizing the liquefied petroleum gas. This consists of supplying the necessary heat of vaporization to convert the material from the liquid to gaseous state. Thus, some type of heat exchanger is necessary.

The simplest means of supplying the necessary heat, and one which is used in some instances in plants where undiluted gas is to be distributed, is to supply heating coils within the storage tank itself and thus use this vessel as a vaporizer as well as a storage vessel. When propane is used, even the heating coils can be dispensed with, the vapor pressure of this material being in itself sufficient at all temperatures encountered.

14. The preferred and recommended method of vaporization is by a separate apparatus, which may be of the unfired or the fired type. In its simplest form an unfired vaporizer may consist of a length of pipe carrying hot water or steam, passing through a small vessel into which the liquid gas is introduced and in which the vaporization takes place.

The same idea may be extended, and multiple pipes or tubes supplied in which heat exchange surfaces are of much greater area and where the heat transfer takes place more rapidly. Further extension of this idea leads to fairly complex coil and tank arrangements where hot water or steam circulates through the tank, while the vaporization takes place in coils and tubes. Materials for pipes or vessels carrying liquefied petroleum



Liquefied butane tanks used in butane-air distribution by the Washington Gas & Electric Co., Everett, Wash.

gas should be those which are not subject to rapid corrosion from this material or impurities. Ordinary steel pipe, yellow brass or stainless steel are preferable to copper.

Every vaporizer must have some suitable device for shutting off the supply of liquid, or closing the vapor outlet, in the event of failure of the heating medium or because of the passage of liquid into the outlet lines due to overloading. In the more complicated vaporizers, regular flow can best be maintained if a vapor line connects the vapor space in the storage tank with the vapor exit line.

15. Large installations, those distributing to wide geographic areas, and those supplementing or replacing manufactured or natural gas, generally mix the vaporized gas with air to give a fuel of lower heat value, comparable to that of manufactured or natural gas. In the latter instance, the vaporizer and mixer are often direct fired. Storage facilities for the mixed gas previous to distribution are also necessary.

16. Duplicate units are desirable in order to avoid interruption of service and to allow one unit at a time to be closed down for inspection and repairs.

Code Requirements:

17. Construction requirements for vaporizers should conform with NBFU Pamphlet No. 58, Section on "Vaporizer and Housing."

Housing of Equipment:

18. Direct fired vaporizers and mixers should be placed out of doors. If placed in buildings, the building should be of fireproof construction and should be entirely separate from any building used for other purposes.

MIXING

19. Equipment of various types is used to mix the vaporized gas either

with air or with manufactured or natural gas. The various combinations are too numerous and complicated to be described in detail in this pamphlet but the general safety principles are similar to those previously brought out in connection with other equipment. Pressure relief valves and back flow and stop flow valves should be provided where needed; correct materials should be used in construction.

All equipment should be properly grounded and all electrical equipment should be of the type approved for use in Class I, Group D (Hazardous Locations) of the National Electrical Code. Fire protection, both of the fixed and portable type, should be provided and the apparatus so arranged that it is accessible for periodic inspection and repair.

20. Proper adjustment of heat value of gas-air mixtures will usually insure that the mixture is above the upper explosive limit, and consequently safe from explosion during distribution. A device should be installed which will automatically shut off the entire flow of gas before an explosive mixture is reached.

Odorization:

21. An approved odorant should be added during the mixing operations or in cases of an undiluted gas, immediately following the vaporization. After odorization, the presence of the gas should be detectable down to a concentration in air not to exceed one-fifth the lower limit of combustibility. Although odorants are usually added at the refinery, it is often necessary to provide additional amounts at the distributing plant.

GAS STORAGE

22. The storage of gas after mixing with air or with manufactured or natural gas is practically the same as that encountered in the conventional gas industry. However, for economic reasons, most of the new plants are providing high pressure storage or are introducing the mixture directly into the line.

Old manufactured gas plants having low pressure water seal holders are often using their old storage equipment for liquefied petroleum gases or the mixtures they are now handling. In such cases, trouble is frequently encountered due to the greater solubility of liquefied petroleum gases in water. Covering the water seal with an oil film will help correct this trouble providing the oil film is renewed from time to time, because it too is absorbed by the liquefied petroleum gas.

23. Many of the precautions previously outlined in relation to liquid storage tanks apply to gas storage tanks as well, as stated in Paragraph No. 3. Such storage should be 50 feet from buildings and property lines. If the gas storage tank is of a high pressure type, it should conform with all code and law requirements as outlined in paragraphs No. 6 and No. 8. The fire protection requirements outlined in paragraph No. 13 also apply.

DISTRIBUTION

24. The distribution system of a central liquefied petroleum gas plant will consist of a series of mains and service lines, carrying the product from the central plant to the appliances of the consumer. In the case of new systems, the problems will be similar to those of any manufactured gas company. When undiluted gas is to be distributed, this will usually be done at a pressure of around 5 pounds instead of the customary pressures of less than one pound.

Piping:

25. Welded pipe construction is advisable. Usual precautions against corrosion need to be taken and these

are decided upon by soil condition, of which an actual survey should be made and the requisite amount of painting or pipe covering then provided. In the case of undiluted gas, the 5 pounds distribution pressure will be reduced by a regulator at each consuming point before the gas enters the appliance.

Old Distribution Lines:

26. The principal problems will be encountered when liquefied petroleum gas, or its mixtures with air, manufactured or natural gas is placed through old distribution systems. Many existing systems are very old and pipes are badly corroded. In some instances mains, and more particularly service lines, are actually perforated, but continue to be serviceable because the openings are caked over with hard clay or mud, preventing leaks.

However, when a gas of different composition is introduced, it may penetrate this coating, causing excessive losses with the possibility of dangerous collections of gas forming in basements and underground cavities. Therefore, after liquefied petroleum gas has been introduced into old distribution systems, a continual check should be made of the conditions of the piping, joints and seals and such renewals as necessary should be made.

27. Undiluted liquefied petroleum gas should not be distributed at increased pressures through old manufactured or natural gas pipe lines.

Leaks:

28. Due to the solubility effect of the liquefied petroleum gas, pipe thread compound that will provide a pure non-metallic film should be used. The compound should provide protection against corrosion or deterioration, making a perfect seal, not take a permanent set, make it possible to remove valve or fittings at any time without damage, not be soluble in water, oil, or gas and withstand a pressure of 250 lbs. per sq. in. Ordinary pipe dope should not be used. Lubricants for stop cocks should be especially prepared for the purpose.

29. As gas leaks are usually difficult to locate in the pipe lines, it is desirable to use a combustible gas indicator for this purpose. This will be found to be desirable both from the standpoint of economy and safety.

30. Pipe line joints are the source of many leaks. It is desirable therefore to check them carefully in old systems and give them special attention in installation of new lines.

31. Removal of moisture from the air or other diluting gases at the plant will eliminate some of the danger of internal corrosion in the distribution system.

Appliance Adjustments:

32. Any established manufactured or natural gas distributor is under obligation to his customers to continue to supply a gas which will operate satisfactorily in the customers' appliances. If any radical change is made in the composition of the gas, the distributor is responsible for any appliance adjustment which may be necessary, since the user is neither willing nor able to make such adjustment.

Therefore, if any change in the gas composition is contemplated, a careful investigation of the adaptability of the appliances already in use should be made. If adjustments are necessary a major conversion problem exists. Unless such adjustments are made, many accidents are likely to occur.

Since the principal characteristics of a gas or gas mixture, which govern its performance in burners or other appliances, include the heat (Btu) value, the specific gravity, and rate of flame propagation of the air-

gas mixture, the best solution is to so adjust these characteristics in the new mixture containing liquefied petroleum gases so that the fewest possible appliance adjustments are necessary. These should be made speedily in order to minimize the length of the change-over period, preferably by a crew of experts specifically trained in such operation.

Acknowledgment

The Liquefied Petroleum Gas Research Committee gratefully acknowledges the cooperation and helpful suggestions of the Interstate Commerce Commission, Bureau of Motor Carriers; Phillips Petroleum Co.; the Liquefied Petroleum Gas Association; National Butane-Propane Association; the American Petroleum Institute; and the Standard Oil Co. of N. J.

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Large Newspaper Display Ad Shows Company Expansion

Nobody in Jackson, Miss., is unaware of the opening of Sandifer Butane Gas Co.'s big new LP-Gas plant —not if they read the Jackson Clarion that is.

On July 11, the company, a division of the Sandifer Oil Co., Inc., published a two-page, pictorial advertisement in the Mississippi daily, announcing with a flourish that Sandifer now stands ready to supply Jackson with butane. The plant itself, company personnel, and displays of the ranges, heating stoves, refrigerators, and water heaters that the company will handle came in for individual pictorial treatment.

With the slogan "Better Butane Service" spread across the top of two full pages in a huge banner, the ad led into a description of the company's facilities — including state-licensed servicemen and salesmen and executives with long experience in the LP-Gas industry.

Under the supervision of Bishop W. Sandifer, president of Sandifer Oil Co., Inc., and Earl Hanna, special assistant, the company is directly operated by B. C. Knight, manager of the butane division of Sandifer Oil.

Kerrville Butane-Air Plant Sold to Lone Star Gas Co.

Sale of the municipally owned Kerrville, Tex., butane-air town plant and distribution system to Lone Star Gas Co., of Dallas, was voted in a special election in June.

Needed facilities, to be built from Lone Star's terminal at Hamilton, will be completed late in 1949, according to Chester L. May, vice president. During the interim, Lone Star has pledged to provide "ample supplies of butane and the necessary improvements and expansion to insure uninterrupted service."

The Kerrville plant was originally constructed in 1930 by private capital but was sold to the city of Kerrville in 1934. Facilities included a 24,000-gal. horizontal storage tank for butane. A 550-Btu gas is served.

For years the plant has been under the supervision of City Manager G. S. Cone and management of Roy Seymour.

Use of Unfired Pressure Vessels In LP-Gas Industry

By E. O. MATTOCKS
Phillips Petroleum Co., Bartlesville, Okla.

Part 3.

An unfired pressure vessel used in liquefied petroleum gas service is subject to exterior corrosion. If the container is installed aboveground the exterior corrosion is evident from casual inspection. Necessary protection in the form of paint or its equivalent is ample to retard most atmospheric corrosion. Containers which have been in service for a great number of years have thoroughly demonstrated that the control of this type of corrosion is not difficult.

In the absence of internal corrosion and in view of the fact that any external corrosion which might exist can be easily controlled, the liquefied petroleum gas industry has not considered it necessary to provide for a corrosion allowance for containers placed aboveground.

Although an unfired pressure vessel may be placed underground, the same construction requirements prevail as for an aboveground container. It is readily recognized that the maximum ground temperature in all locations in the U. S. is considerably lower than the maximum atmospheric temperature which might be encountered at the same location. Obviously, if 100 F is considered as the maximum temperature to which the liquid in a container will be heated by the atmosphere, the maximum liquid temperature in an underground container will be considerably lower. The exact amount of this temperature difference will depend upon the location in the U. S. but generally this difference will be of an order of 20 F or more.

Although an underground container has been designed to handle a product with a maximum vapor pressure at 100 F, nevertheless the maximum vapor pressure will be considerably less. This lower working pressure inherently provides a corrosion allowance for underground containers. In other words, the container may be corroded a reasonable amount before the metal fiber stress developed at the maximum ground temperature is equal to that which would exist in an aboveground vessel during the maximum atmospheric temperature experienced at that location. Furthermore, underground tanks must have their exterior surfaces protected with a suitable coating which serves to inhibit or reduce corrosion.

Safety Precautions

In addition to providing a container which incorporates the best known safety construction features, the various appurtenances placed on the vessel are designed to assure maximum safety to the container as well as to provide for the continued safe usage of the LP-Gas. One of the most important safety features attached to a container is the pressure relief device.

The use of safety valves on vessels containing liquefied petroleum gas is somewhat different from the use of safety valves on unfired pressure vessels used as air receivers or as process vessels. In these latter cases the operating pressure generally is slightly less than the setting of the relief device. If for any reason the controls governing the maximum pressure of these vessels fail to function or some other operating difficulty is encountered and the pressure increases to the designed working pressure of the vessel, the safety valves function so that the pressure will not rise appreciably above the design working pressure of the container.

In the case of liquefied petroleum gas vessels, however, very seldom, if ever, is the normal operating pressure near to or equal to the design working pressure. In fact, the average operating pressure of a liquefied petroleum gas vessel is, generally, about one-half of the design working pressure. Likewise, since liquefied petroleum gas is a flammable material, it is highly desirable that none of it be permitted to escape unless an emergency exists.

Since the design working pressure of an LP-Gas container is above the maximum expected operating pressure and the safety valve is not needed to limit overpressure due to varying operating conditions, and since it is definitely undesirable to permit liquefied petroleum gas to escape except in case of an emergency, it is evident that the setting of safety valves on an LP-Gas vessel is for a purpose quite different than that governing the setting of safety valves on steam boilers, air receivers, and process vessels. The prime purpose of a safety device on an LP-Gas container is to protect it against an emergency, the container being adequately designed to take care of all anticipated operating conditions.

The emergencies for which an LP-Gas tank must be protected are:

1. An external fire.
2. Placing inside the tank a product with a higher vapor pressure than that for which the tank was designed.
3. Overfilling the tank.

A vessel containing liquefied petroleum gas may be involved in a fire from any cause directly associated with the contents of the tank or from exposure to a fire from adjacent material. As previously indicated, when the contents of an LP-Gas container are heated its vapor pressure increases and the tank must be protected against rupture from over-pressure by venting through a safety valve. The relief device must be of a size sufficient to relieve the excess pressure which might be generated by the worst

DESIGN, CONSTRUCTION and OPERATION of LP GAS CONTROL EQUIPMENT
SUGGESTED APPLICATIONS for LP GAS CONTROL EQUIPMENT
INDEX and PRICE LIST
CAPACITY TABLES PERFORMANCE DATA, etc. for LP GAS CONTROL EQUIPMENT
EXCERPTS from NBFU PAMPHLET No. 58 (Pertaining to LP Gas Control Equipment)
SPECIFICATIONS and DRAWINGS of LP GAS CONTROL EQUIPMENT
REGO
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type of fire possible. This fire condition is recognized, generally, as the worst hazard which might be encountered and in practically all cases the safety valve or valves are sized for fire conditions.

It is possible that a product may be placed in a container with a vapor pressure at 100 F which is higher than that for which the tank is designed. If such contents are heated by the atmosphere or by other means, it is possible that the vapor pressure will exceed the design working pressure of the container. This will happen usually only during hot weather or when an external fire envelops the tank. It is necessary, therefore, that the tank be provided with safety valves to keep the tank from rupturing if the contents are heated to a temperature which would result in over-pressuring the container. A relief device sized for fire conditions has more than sufficient capacity to take care of this undesirable condition.

Must Leave Vapor Space

Since liquefied petroleum gases have a relatively large coefficient of expansion it is necessary to leave sufficient vapor space in the top of containers to permit the liquid to expand when heated and still not fill the containers liquid full. Methods of measuring the liquid level so as to provide the necessary vapor space will be discussed later. If, however, a container is overfilled for any reason, the relief device must be of sufficient size and design to relieve any over-pressure which might be developed if the container should become liquid full, thus protecting the vessel from rupture due to hydrostatic pressure.

Since liquefied petroleum gas is a flammable material it is necessary that safety valves be so constructed that they do not leak or seep until the valve is starting to discharge. Unlike safety valves used in air and steam service where small leakages are not considered objectionable, the safety valves used in liquefied petroleum gas service are provided with soft seats or with some sealing rings which do not permit any leakage past the valve until valve starts to open. While the use of soft seats and soft sealing washers or rings has some definite advantages, their use also has certain disadvantages.

Since the design of an LP-Gas container is such that the safety

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Today he is technical representative of Chemical Products and Chemical Engineering Departments of Phillips.—Editor.

valve will not operate except during an emergency, the relieving device may not be opened for a period of several years. During this long period of time the spring action of the device is being applied continuously against the soft seat or soft sealing ring, which may result in a depression of the soft sealing material. This action will produce a slight elongation of the spring. Likewise this long continued contact may result in a sticking or vulcanization between the soft sealing seat or ring and the contacting metal surface.

Because of these two actions, it is very difficult to insure relief devices so constructed opening at a specific pressure throughout its life. Although the valve may be designed to operate within a very small pressure range and may be initially set at a desired start-to-discharge pressure, after a prolonged period of time a change in the initial setting may occur.

Having experienced such differences between the opening pressure and the original set-pressure after prolonged service, the liquefied petroleum gas industry set up requirements that the start-to-discharge pressure of relief devices should be within a pressure range rather than at an exact pressure.

Safety valves used on steam boilers and air receivers are set generally to pop at a given pressure, no great concern being given to the pressure at which they start to open or leak. Because of the flammable nature of liquefied petroleum gas, consideration by the LP-Gas industry has been given primarily to the pressure at which the valve leaks or starts to discharge rather than the pressure at which it pops.

Since all unfired pressure vessels have been hydrostatically tested to at least 2 times their design working pressure for ASME Code vessels and 1½ times design working pressure for API-ASME Code vessels, and since as previously indicated, corrosion is not a factor, and since it is very desirable to keep the contents of the containers from escaping unless an emergency exists, no hazard appears to exist in setting safety valves to start to discharge in the case of vessels designed according to paragraphs U-68 and U-69 of the ASME code at pressures higher than the design working pressure.

The Start-to-Discharge Points

In fact, it has been the practice of the liquefied petroleum gas industry for some time to set the relief valves on these vessels to start to discharge from 100 to 125% of the design working pressure. In the case of vessels constructed according to the API-ASME unfired pressure vessel code, the safety valves have been set to start to discharge at a pressure of 80 to 100% of the design working pressure. In the case of unfired pressure vessels constructed according to the alternate rules of the ASME code paragraphs U-200 or U-201, the relief valves have been set to start to discharge at from 90 to 100% of the design working pressure.

Because of the use of soft seats

and soft sealing rings in relief devices on containers handling liquefied petroleum gas, it has been considered necessary generally to allow a 20% accumulation which is defined as the difference between the maximum allowable start-to-discharge pressure and the pressure at which the relief valve attains its rated capacity. Under this condition the highest possible pressure in the container when the safety valve is wide open is still less than the minimum hydraulic pressure to which the vessel was subjected initially.

It has been the thought of the liquefied petroleum industry that the design working pressure of the container should be such that with the safety valve wide open the factor of safety at the seams in the vessel would be at least 3.33 regardless of the code or paragraph under which the vessel was constructed. This represents only a slight deviation from the factor of safety of 3.6 which is permitted when the safety valve is wide open in the proposed revision to the ASME code for unfired pressure vessels.

The principal difference is that the proposed ASME revisions permit only a 10% accumulation while the liquefied petroleum gas industry has considered it necessary to employ a 20% accumulation. This small difference appears to be inconsequential when considering that unfired pressure vessels used in liquefied petroleum gas service are practically free of detrimental corrosion and the safety valves will operate only during an emergency.

The liquefied petroleum gas industry, in cooperation with the National Fire Protection Association, has set forth the required capacity of safety valves for various vessel sizes and design pressures. These capacities were determined as a result of a study of the safety valve requirements made by the Bureau of Explosives early in the history of the LP-Gas industry. John F. Fetterly, an inspector for the Bureau, published Nov. 27, 1928, a report entitled "The Determination of the Relief Dimension for Safety Valves on Containers in which Liquefied Gas is Charged and When the Exterior Surface of the Container is Exposed to a Temperature of 1200° F." In this publication the following formulas were set forth:

Safety Valves for Insulated Containers

$$M = 110\ P\ D\ N \quad (1)$$

M=weight of steam discharge per hour through the safety valves in pounds.

P=the absolute pressure of the steam in psia.

D=Diameter of safety valve in inches.

N=the lift of the safety valve in inches.

If the diameter is desired the formula can be rearranged:

$$D = \frac{M}{110\ P\ N} \quad (2)$$

$$L = 0.185\ T\ (V_1 - V_2)\ \frac{dp}{dt} \quad (3)$$

L=Latent heat of vaporization of liquid gas in Btu per pound at pressure P.

T=the absolute temperature in degrees Fahrenheit at pressure P.

V_1=the volume of the gas (vapor) in cubic feet per pound at pressure P.

V_2=the volume of the liquid in cubic feet per pound at pressure P.

$\frac{dp}{dt}$=the slope of the vapor pressure curve in pounds per sq. in. per degree F temperature change at P.

P=absolute pressure of the gas in psia.

The original steam formula was converted for use with any gas, based on the assumption that the velocity of flow of gases at a given pressure through an orifice of a given area varies inversely as the square root of their densities.

Substituting the proper values in equation (2) the following relationship was obtained for determining the diameter on the safety valve:

$$D=\frac{(B\pi U+2E)\,C\,(t_1-t_3)}{110\,L\,P\,N}\sqrt{\frac{W_3}{W_1}} \quad (4)$$

B=diameter of the inside wall of insulation and is equivalent to the outside diameter of the metal container.

π=3.1416

U=equals the length of the container in feet.

E=the area of end of container in square feet.

C=heat transfer in Btu per square foot per hour per degree F temperature difference between the temperature at the outside of the insulation and the temperature of the contents of the container when at the pressure at which the safety valve is set to open.

t_1=temperatures in degrees F at outside surface of insulation which is considered 1200 F.

t_3=temperature in degrees F of contents of container at pressure at which the safety valve is set to open.

W_3=density of steam in pounds per cubic foot at pressure P.

W_1=density of gas vapor in pounds per cubic foot at pressure P.

Safety Valves for Uninsulated Unmachined Steel Containers

Under this heading the following steam formula was used:

$$M=50\,P\,A \quad (5)$$

M=weight of steam discharge per hour in pounds.

P=absolute pressure of steam in psia.

A=area in square inches for valve having a seat of any angle.

Substituting the proper values in equation (5) the following relationship similar to equation (4) was developed for any gas:

$$A=\frac{(B\pi U+2E)\,C\,(t_1-t_3)}{50\,L\,P}\sqrt{\frac{W_3}{W_1}} \quad (6)$$

The terms in this formula are similar to those in equation (4).

The formula for the heat transfer factor C—is as follows:

$$C=\frac{(t_1-t_3)}{a} \quad (7)$$

C=Btu transmitted to contents of container per square foot of container surface per hour per degree F temperature difference between 1200 F and the temperature of container contents when at the pressure at which the safety valve is set to open.

t_1=temperature in degrees F on outside surface and equals 1200 F.

t_3=temperature in degrees F of contents of container at pressure at which the safety valve is set to open.

$$a=62.5+20\,r \quad (8)$$

r=thickness of container wall in inches.

The equation used by the liquefied petroleum gas industry is the one developed for uninsulated ves-

TABLE 5

REQUIRED SIZES OF SAFETY VALVES FOR CONTAINERS, OTHER THAN INTERSTATE COMMERCE COMMISSION CONSTRUCTION AS CLASSIFIED UNDER SECTION B.9.

	Minimum Required Safety Valve Actual Free Discharge Area -(Square Inches)					
	Type 80 lb. Min.	Type 100 lb. Min.	Type 125 lb. Min.	Type 150 lb. Min.	Type 175 lb. Min.	Type 200 lb. Min.
Where (D X U) is not over 10	.32	.27	.22	.19	.18	.16
Over 10 but not over 15	.46	.38	.30	.25	.24	.21
" 15 " " " 20	.60	.50	.42	.36	.33	.29
" 20 " " " 40	1.25	1.03	.84	.71	.64	.57
" 40 " " " 60	1.90	1.57	1.25	1.06	.94	.83
" 60 " " " 80	2.50	2.06	1.68	1.43	1.25	1.10
" 80 " " " 100	3.15	2.60	2.13	1.81	1.58	1.40
" 100 " " " 120	3.80	3.14	2.48	2.10	1.87	1.65
" 120 " " " 140	4.45	3.68	2.90	2.46	2.15	1.90
" 140 " " " 160	5.10	4.21	3.33	2.83	2.43	2.15
" 160 " " " 180	5.80	4.79	3.55	3.09	2.72	2.40
" 180 " " " 200	6.05	5.00	3.77	3.20	2.83	2.50
" 200 " " " 220	6.30	5.21	3.93	3.33	2.94	2.60
" 220 " " " 240	6.55	5.41	4.09	3.47	3.06	2.70
" 240 " " " 260	6.80	5.62	4.25	3.61	3.17	2.80
" 260 " " " 280	7.05	5.82	4.41	3.74	3.28	2.90
" 280 " " " 300	7.30	6.03	4.57	3.88	3.40	3.00
" 300 " " " 320	7.55	6.24	4.73	4.02	3.51	3.10
" 320 " " " 340	7.80	6.44	4.89	4.15	3.62	3.20
" 340 " " " 360	8.05	6.65	5.05	4.28	3.74	3.30
" 360 " " " 380	8.30	6.86	5.21	4.42	3.85	3.40
" 380 " " " 400	8.55	7.06	5.31	4.55	3.96	3.50
" 400 " " " 420	8.80	7.27	5.53	4.70	4.08	3.60
" 420 " " " 440	9.05	7.48	5.69	4.83	4.19	3.70
" 440 " " " 460	9.30	7.68	5.85	4.97	4.30	3.80
" 460 " " " 480	9.55	7.89	6.01	5.10	4.41	3.90
" 480 " " " 500	9.80	8.10	6.17	5.23	4.52	4.00
" 500 " " " 520	10.05	8.30	6.33	5.37	4.64	4.10
" 520 " " " 540	10.30	8.51	6.49	5.50	4.75	4.20
" 540 " " " 560	10.55	8.72	6.65	5.65	4.87	4.30
" 560 " " " 580	10.80	8.94	6.83	5.79	4.97	4.40
" 580 " " " 600	11.05	9.14	6.98	5.92	5.09	4.50
" 600 " " " 620	11.30	9.35	7.15	6.05	5.19	4.60
" 620	To be calculated using Fetterly's formula as promulgated by Bureau of Explosives, New York City, using 1000°F. (t_1) instead of 1200°F.					

Note: For Underground Tanks see Section 3.7.
Note: D — outside diameter of container in feet and fractions thereof.
Note: U — overall length of container in feet and fractions thereof.

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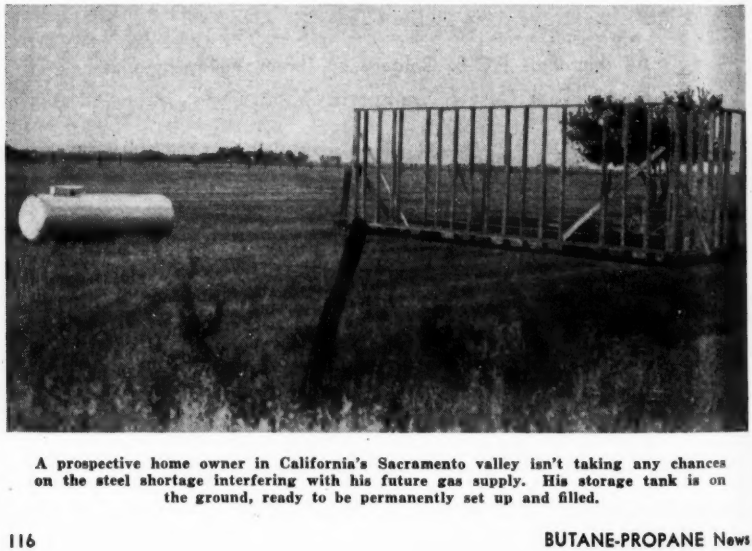
Note: D = outside diameter of container in feet and fractions thereof.
Note: U = overall length of container in feet and fractions thereof.

sels. After using the formula for some time, a slight modification was made. Because of the less possibility of large containers having their entire outside surface enveloped in a fire and at a temperature of 1200 F it was assumed that the outside temperature of the container changed from 1200 F to 1000 F for the larger containers. It was assumed further that for containers up to a size of approximately 10,000 gallons water capacity (DU=140-160) the outside surface was 1200 F while for containers of water capacity of 10,000 to 30,000 gallons (DU=480-500) the exterior surface temperature decreased gradually from 1200 to 1000 F.

This assumption was based on a uniformly decreasing surface-temperature with increasing size. A further assumption was made in arriving at these results and that was that the diameter of the tank was 1/8 its length.

To assist in the determination of the required safety valve area, equation (6) was arranged so that the only unknown would be the overall length and the exterior diameter of the container. This assumed the use of flat ends on the tanks which is on the safe side. The required safety valve areas for a given value of DU where D is the outside diameter of the container in feet and fractions thereof and U is the overall length of the container in feet and fractions thereof were tabulated and published in the National Fire Protection LP-Gas code and are presented in Table 5.

Concluded Next Month



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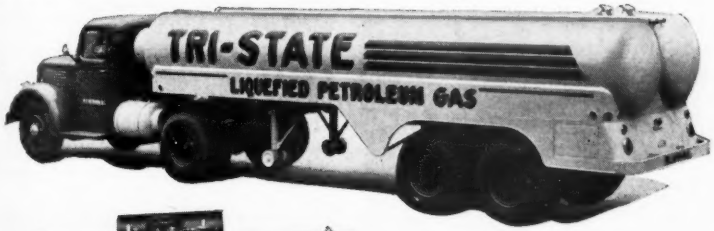

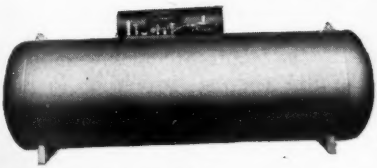

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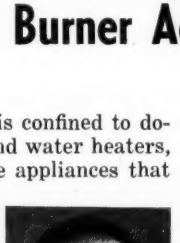
Properties of LP-Gas to Consider for Proper

Burner Adjustment

By C. C. DUDLEY
Skelly Oil Co., Kansas City, Missouri

THIS discussion is confined to domestic ranges and water heaters, but since all of the appliances that are used with LP-Gas depend on combustion for their usefulness, we can apply this same information to most of the other appliances.



C. C. DUDLEY

We should be familiar with all the properties of LP-Gas and follow the rules as set up by National Board of Fire Underwriters and any state or local regulations in making an installation. There are certain properties of LP-Gas which we must consider if we are to properly adjust appliances, especially such properties as specific gravity of the gas vapors, limits of inflammability, rate of flame propagation, heating value and the amount of air required for complete combustion.

Specific gravity of the gas or the weight in relation to air must be considered because we want to know what becomes of unburned gas. The specific gravity of propane vapor is 1.5 and butane 2.0; air equals 1.0. Both fuels are heavier than air and will settle to a low point when released to the atmosphere unless there is a good air current to dilute and wash the gas away.

The limits of inflammability are quite narrow, which in some respects is a good feature, but remember that it doesn't take much LP-Gas to make an inflammable mixture. For propane, the lower limit is 2.4% gas and the upper limit is 9.5% gas. For butane, both limits are slightly lower. Due to the narrow limits of inflammability, a slight change in the amount of air or gas in a gas-air mixture definitely affects the operations of most burners; it also makes a small leak a very dangerous condition.

The rate of flame propagation, or the speed at which flame will travel, is rather high when compared to most other fuels. The high rate of flame propagation accounts for the short flame on the burner ports as

In Two Parts—Part I

well as some of the back flashing, which we are often called upon to correct. Due to the high rate of flame propagation, it is necessary to use smaller ports than would ordinarily be used with natural gas.

The smaller ports speed up the velocity of the gas-air mixture to a point where the speed of the gas-air mixture is faster than the flame will travel. The rate of flame propagation is increased by increasing the amount of primary air in the gas-air mixture so if you have some back-flashing, try reducing the amount of primary air if the flame is not too soft.

Comparison of Heat Values

The heating value of propane is about 2500 Btu per cubic foot, or about 2½ times as rich as natural gas. Butane-propane mixtures are still richer in heat units, depending on the mixture. Straight butane has about 3200 Btu per cubic foot. This does not mean that the flame temperature is higher than natural gas, but it does work out that one cubic foot of propane, properly used, will do as much work as 2½ cubic feet of natural gas. (Natural gas heating value 1000 Btu, per cubic foot.)

Air required for complete combustion of propane is about 24 parts of air to 1 part of gas and for straight butane about 31 parts of air to one part of gas. Natural gas requires about 10 parts of air to one part of gas or, in other words, for each 1000 Btu of gas, either LP-Gas or natural gas, about 10 cubic feet of air is required for combustion. So far as the total amount of air is concerned, we are about on a par with natural gas, but since we use a much smaller quantity of gas to do the same amount of work, our entrainment system must be more efficient. This is accomplished by using burners and spuds especially designed for LP-Gas.

THE ACCOMPANYING PAPER was presented at the LP-Gas Appliances Short Course, University of Tulsa, in June.

Mr. Dudley is associated with the Skelgas Division of the Skelly Oil Co. and has given special study to the adjustment and operation of gas burners, as he so clearly demonstrates in his text.—Editor.

Atmospheric air is composed of about 21% oxygen, 78% nitrogen, and traces of other gases which we will forget. The oxygen is the useful part so far as we are concerned for combustion. Nitrogen is an inert gas and has no useful value so far as combustion is concerned.

Combustion

A. Combustion, or burning, is the rapid combination of a gas with oxygen.

B. Solids and liquids must be vaporized before they will burn.

C. Liquefied petroleum gases, like most inflammable gases, will not burn until mixed with air or oxygen; therefore, we have the problem of supplying and controlling air required for combustion.

Air for Combustion

A. Primary air.

(1) Primary air is the air that is drawn into the burner and mixes with the gas inside the burner.

(2) Usually the primary air is only

about half of the air required for complete combustion.

B. Secondary air.

(1) Secondary air is the air that mixes with the gas-air mixture as it emerges from the burner ports, and completes the supply of air required for complete combustion.

Methods of Supplying Primary Air

A. The stream of gas leaving the orifice has a certain amount of energy, which is known as kinetic energy. The faster this stream of gas travels, the greater the amount of kinetic energy available. The stream of gas traveling in the mixer or venturi, creates a slight vacuum at the mixer face and the air is drawn into the mixer or venturi with the gas (see figure 1).

Primary Air Entrainment

A. Gas pressure behind the orifice.

(1) Effect of low gas pressure. We can expect a lazy flame, due to a shortage of primary air.

B. Burrs on the orifice.

(1) Burrs on the orifice break up the gas stream, reduce the amount of primary air entrained. Adjustable orifice spuds or an orifice with a burr does the same thing to a stream of gas that an adjustable garden hose nozzle does to a stream of water when it is adjusted to produce a spray.

C. Orifice not centrally drilled or orifice not in alignment with burner mixer.

(1) Gas stream will crowd side wall of mixer, causes poor air entrainment. I have seen burners with short mixers where the orifice being out of alignment with the mixer, produced a sharp flame on one side of the burner head and a lazy flame on

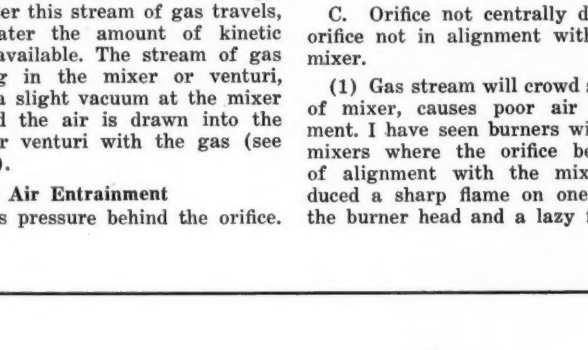


Fig. 1. Method of supplying primary air to burner.

the other side. Poor burner design entered into this problem.

D. Improper size of spud orifice.

(1) Gas-air ratio would be thrown off.

E. Distance of spud to the mixer of the burner.

(1) Too close; causes restriction between spud and mixer and stream of gas may pass through mixer without spreading to fill mixer and develop vacuum.

(2) Too far away; gas stream may spread before it enters mixer and bounce back out the air shutter.

F. Burner design and size.

(1) Interior design and size of passages. If the interior of the burner is rough or has obstructions, such as core sand, casting wires or other material, the air entrainment will be affected.

Controlling Primary Air

A. Most burners have adjustable air shutters, but there are some burners that are so accurately made that primary air control shutters are not necessary.

Supplying Secondary Air

A. The manufacturer provides certain openings below the level of the burners so that air is drawn in below the burner and as it passes the burner, it provides the oxygen necessary to complete combustion. If you are making a conversion, the problem of supplying secondary air is yours.

Factors Which Effect Air Entrainment

A. Location of appliance. Keep away from strong drafts, cold and hot air registers.

B. Dirty appliances, gas saving gadgets such as steel wool in the vent opening of an oven.

C. Improper assembly of appliance parts, such as oven lining or oven bottom.

D. Soot or foreign material in flue passages as with water heaters and Servel refrigerators.

E. Excessive drafts or back drafts in the chimney.

Controlling Secondary Air

A. Some central heating systems have adjustable secondary air devices, but on the usual domestic appliance the manufacturer figured what was required and there is no adjustment to be made.

(Concluded next month)

Properties of LP-Gas to Consider to Properly Adjust Burners

Specific gravity of gas vapors

Inflammability limits

Rate of flame propagation

Heating value

Air requirements for complete combustion

Railroads Use Actual Weights For Western Tank Cars

The carriers have withdrawn LP-Gas tariffs on movements in tank cars from producing points in Colorado, Montana, Nebraska, South Dakota and Wyoming to various Western points that sought to use an estimated weight of 6.6 lbs. per gallon.

Actual weights will be used as had been the practice in the past.

ASSOCIATIONS

NBPA's Third National Convention Ready to Open in Chicago Sept. 20

D. L. BRETING

H. G. WEAVER

FINAL steps are being taken in the planning of the annual National Butane-Propane Assn. convention and trade show, scheduled for the Congress hotel, Chicago, Sept. 20-22. President of the association, John M. Robinson, Woodworth, La., will preside.

In place of the formal banquet which has been a feature of former NBPA conventions, Elwin E. Hadlick, executive vice president of the association, has announced a "Frontier Days" program for the evening of the 21st in the Gold room of the Congress hotel. Convention-goers will relax from the rigors of business meetings and conferences that evening, with dinner from a smorgasbord table and an entertainment program.

Other convention highlights include a fire-control demonstration on the testing grounds of the Peoples Gas Co., of Chicago, to be conducted by Ansul Chemical Co. on Sept. 22, and an exhibit of modern and newly developed LP-Gas equipment in the Casino room of the Congress, which will be open throughout the convention period, except during speeches. Both programs are without charge; tickets for them may be obtained at the association's registration table in the hotel.

For the first time this year, Mr. Hadlick has reported that vacancies in the NBPA directorate will be filled by direct vote of the attending members, after prospective officials have been nominated by a nominating committee. There are four vacancies to be filled this fall. Named to the committee by NBPA directors were: J. H. Winton (chairman), Winton Automatic Gas Co., Beaumont, Texas; C. A. Nelson, Butane Gas Corp., Omaha; M. G. Ostgaard, Minngas Co., Tra-

cy, Minn.; J. M. F. Hays; Earl C. St. Cyr, Cyr Bottled Gas Co., Marquette, Mich.; William Schlanger, Sungas Products of Pennsylvania, Inc., Scranton, Pa.; and E. L. Young, Liquefied Gas Co., Pendleton, Ore. In addition to names proposed by this committee, nominations may be made from the floor by members.

There may be a maximum of 24 directors for the association, two from each of the 10 districts in the United States, two from Canada, and two from Mexico.

Prominent among the convention scheduled speakers are Henry G. Weaver, director, customer research staff of General Motors Corp., Detroit, and D. L. Breting, of the Underwriters' Laboratories, Inc., Chicago.

The full program follows:

Leslie C. Allman, vice president, Fruehauf Trailer Co., Detroit—"How About the Road Ahead?"

Marshall H. Massey, Ross-Martin Co., Tulsa—"Records Which Point the Way to Profits."

Dan R. Blount, International Shoe Co., St. Louis—subject to be announced.

D. L. Breting, Underwriters' Laboratories, Inc., Chicago—"The Whys of Safety Requirements for LP-Gas Equipment."

Walter Hanau, assistant superintendent, engineering department, Fidelity & Casualty Co., Chicago—"Inspection Will Prevent Accident If —?"

Charles M. Corken, Corken's, Inc., Oklahoma City—"The Revoltin' Evolution, or How To Make a Profit on Short Margins."

E. E. HADLICK

R. J. COUGHLIN

Henry G. Weaver, director, customer research staff, General Motors Corp., Detroit—"Mainspring, the Story of Human Progress and How Not To Prevent It."

The new president-to-be will be announced on the second day and thereafter he will preside in Mr. Robinson's place.

At 3 p.m. of the last day of the meeting there will be a conference of state regulatory officials, presided over by R. J. Coughlin, chairman of the NBPA safe practices committee.

South Carolina

Changes and corrections in the bylaws of the South Carolina LP-Gas Assn. have been made as follows:

a. Active members' dues shall be computed on the basis of 1/10 of 1% of the dealers gross gas sales based on the preceding year, or a minimum of $25.

b. Individual affiliate members—$5 per annum.

c. Gas appliance manufacturers or distributors' agents—$10 per annum.

d. Honorary members—none.

Two LPGA Districts Will Meet October 7 in Atlantic City

WALTER NAUMER

ROY FORSBERG

BOTH the South Eastern and North Eastern districts of the Liquefied Petroleum Gas Assn. will meet in Atlantic City on Oct. 7, con-current with the AGA and GAMA convention and exhibition activities in that city.

Scheduled for the afternoon of the 7th, the LP-Gas men of the two sections will meet jointly in the Claridge hotel. Following morning registration and a luncheon, they will hear prominent industrial leaders in addresses on the pertinent problems facing the LP-Gas industry. Already scheduled to speak are J. H. Wallace, general sales manager of United States Steel Corp., who will discuss steel allocation and supply; James Pew, Sun Oil Co., slated to discuss fuel shortages; Arthur Kreutzer, LPGA secretary, discussing legislative trends and regulated safety practices; and Howard White, LPGA executive vice president, who will report on the progress of association activity.

John Van Norden, American Meter Co., is chairman of the LPGA district meeting and is being actively assisted by the district directors, Walter Naumer, Carbide & Carbon Chemicals Corp., and W. S. Lander, Rulane Gas Co. Other members of the committee are: J. Albin Johnson, Fred W. Frost, Frank Boice, Sam Kapnak, Louis E. Seley, Roy E. Forsberg, H. Emerson Thomas, and Frank R. Fetherston.

Hotel reservations must be secured through the Housing Bureau of the American Gas Assn., 16 Central Pier, Atlantic City, N. J.

Preceding the combined meeting of the two districts, the LPGA board of directors will hold its fall meeting in the same hotel. The first session will be on Oct. 6, followed by the closing one on the morning of Oct. 7.

LPGA

LPGA President K. H. Koach has appointed Ralph I. Sieben, Metrogas, Inc., Chicago, as temporary chairman of LPGA's new Utility Section. The purpose of this department is to promote, standardize and advance the interests of LPGA uitility members. When Mr. Sieben has had an opportunity to review the problems, he will proceed to organize the section and to inaugurate a program to correlate with LPGA official activities. Companies interested in this section should contact Mr. Sieben.

Geo. M. Parker, Standard Oil Co. (N.J.), New York, has been appointed temporary chairman of LPGA's In-

there's something about a flame!

IT BOILS BEST
IT BAKES BEST
IT ROASTS BEST

Oxford model, with exclusive "Comfort-Touch"

AND IT BROILS LIKE CHARCOAL

smart cooks know L-P GAS has got it

AND Universal PROVES IT

Gas has captured the hot flame of glowing coals, separated it from its hot bed and applied it, clean and modern, to cooking. Universal gas ranges completely control this natural heat. In boiling, Universal top burners give not three speeds, but four set speeds, plus any more you want. In baking, Universal is famous for uniformity . . . tests show practically no variation in temperature from one corner of the oven to the other. Universal gas ovens keep juices inside the roast and do it while the housewife is downtown . . . on-off by automatic clock control. And for broiling, ask any smart cook about a flame!

Smart cooks appreciate comfort and safety, too. "Comfort-Touch" has added air cooling to the surface of the range, so that oven and broiler doors may be touched at any time with perfect comfort and safety. No range—with or without the precious flame—can claim as much.

PROVE "COMFORT-TOUCH" TO YOUR CUSTOMERS BY INSTALLING A "COMFORT-TOUCH" RANGE AND RUNNING THE OVEN ALL DAY LONG!

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ternational Section by President Koach.

This Section, not to be confused with the Canadian, Mexican or any district outside of the United States, has for its purpose the correlation of all LPGA member interests in the field of export and foreign operations.

When the Section reaches full organization there will be latitude to deal with the export problems of both producers and manufacturers. All companies interested in this Section should get in touch with Mr. Parker.

By virtue of these appointments, Mr. Sieben and Mr. Parker become members of the board of directors, a rule applying to all Section chairmen.

•

Of a total of twelve standing committees, President Koach has to date made the following appointments:

Technical & Standards—Walter H. Miller, Illinois Bottled Gas Co., Chicago.

Safety—F. T. Carpenter, United Petroleum Gas Co., Minneapolis.

Publicity & Advertising—Si G. Darling, Darlingas, Inc., Pratt, Kan.

Appliance Specifications—Floyd Campbell, Phillips Petroleum Co., Bartlesville.

LP-Gas Specifications—G. L. Brennan, Warren Petroleum Corp., Tulsa.

Membership—E. Carl Sorby, Geo. D. Roper Corp., Rockford, Ill.

Legislative—K. W. Rugh, Phillips Petroleum Co., Bartlesville.

Educational—K. R. D. Wolfe, Fisher Governor Co., Marshalltown, Iowa.

Finance—Norman A. Evans, Pressed Steel Tank, Milwaukee.

Insurance—E. C. McEneany, Diablo Co., Walnut Creek, Calif.

Chairmen of the standing committees are members of the board of directors.

Oklahoma

DEWEY NEAL

CY CARNEY

Opening on Sunday, Sept. 12, with registration, placing of exhibits and a fellowship hour buffet supper, the Southwest LP-Gas convention and trade show is set to go on from there with two days of scheduled convention addresses and other features.

The program announced by Fred L. Yates, executive secretary of the Oklahoma LP-Gas Association, includes such subjects of vital interest on Monday, as: "Rural Market Potential in the Southwest," by Dewey Neal, advertising manager of the Oklahoma Farmer-Stockman, Oklahoma City; "Developments of the LP-Gas Industry," by J. T. Bradley, Warren Petroleum Corp., Tulsa; "Handling LP-Gas Profitably," by Charles Corken, Oklahoma City; "Larger Consumer Storage," by J. A. Storm, Sinclair Prairie Oil Co., Tulsa.

Will Have Round Table

Opening the Tuesday's meeting with a "Panel on LP-Gas Operations," by W. E. Fraley, of Abiline, Kan., as moderator, an address on, "Setting Up Routes," by Neal Havens, Union LP-Gas Systems, Inc., Independence, Kan., will follow.

Other subjects on the program for

HARRY CANUP

RAY NOBLITT

that day are: "Increasing Profits through Larger Consumer Storage and Fewer Dumps," by a speaker not selected at this writing; "Decency and Courtesy Among Dealers," by Ray Noblitt, Clarendon, Texas; "Figuring Operation Costs and Arriving at Profit Margin," by M. H. Massey, Ross-Martin Co., Tulsa; "Customer Relations," by Cy Carney, Fayetteville, Ark., and "Creating Wants versus Supplying Needs," by Harry Canup, Hales-Mullaly Co., Oklahoma City; "Reaching Your Market," by Vernon Beals, Beals Creative Printers, Oklahoma City; "What of the Future," by S. B. Crooks, Cities Service Oil Co., Bartlesville, Okla.; "Making the One-to-One Ration Work," by Charles H. Brannon, Butane Appliance Co., Fort Worth.

The convention will close with the annual banquet and "fun night."

Place of the meeting and displays is in the air-conditioned Skirvin hotel, Oklahoma City.

Sunday and the entire forenoon of Monday have been reserved for registration and viewing of exhibits which will be presented by manufacturers and distributors of LP-Gas equipment and appliances from several states.

Colorado

The fall convention and industry exhibit of the Colorado LP-Gas Assn. is to be held Sept. 26-28 in the Shirley Savoy hotel, Denver.

In addition to the regular business sessions and addresses by leaders of the LP-Gas and allied industries, Coloradans will witness a display of new and improved industrial equipment and appliances. In order to alleviate unnecessary time wastage and delay, association officials have arranged the exhibit for a room adjoining those in which will be held business meetings, luncheons, and banquets. The principal arrangements under the direction of Jas. L. Bradley, executive vice president of the association.

The proverbial "businessman's wife" hasn't been forgotten in the arrangements for this convention, either. She'll join the other ladies in attendance for a luncheon and style show in the Lincoln room of the Shirley Savoy. The fashion program is to be presented by Montaldo's, Inc., of Denver.

Association spokesmen reported that invitations to attend the convention had been extended to LP-Gas men throughout the West.

Kentucky

The Kentucky LP-Gas Assn. will hold its first annual convention Oct. 11-12 at the Brown hotel in Louisville.

Plans for the meeting include a trade show with 28 booths, to be set up near the entrance of the convention hall. Target for the convention's business sessions will be complete orientation for Kentucky LP-Gas men with the best in appliances, equipment, and methods, according to Frances L. Holliday, chairwoman of the trade show committee.

In testimonial to their desire to

live up to the standards of safety, service, and good business practice as set up by the association, members are currently signing an "Obligation Scroll," distributed by the association.

The convention will mark the first anniversary of the Kentucky LP-Gas Assn. and its activity in the industry.

National Safety Council

The 36th National Safety Congress and Exposition, sponsored by the National Safety Council, will be held in Chicago from Oct. 18-22. Five leading hotels will house the safety sessions and expositions. They are: Stevens hotel, for the industrial safety exposition and industrial sessions; Sherman hotel, for the public safety exposition and traffic, farm, home and women's safety sessions; Morrison hotel, for industrial and school and college sessions, and Congress and La Salle hotels, for industrial sessions.

For further information, write to George E. Burns, National Safety Council, 20 N. Wacker Drive, Chicago 6, Ill.

NGAA

There is to be a Natural Gasoline Association meeting in Shreveport, La., Oct. 15. The meetings themselves will be held in the exhibit hall at the Fair Grounds, but a cocktail hour will be held in the Washington-Youree hotel.

This meeting is being held in cooperation with the East Texas Natural Gasoline Man's Club and a fine technical program has been arranged. It is probable the total attendance will be near 400.

It is suggested that your hotel reservations be made as soon as possible.

CNGA

W. A. KIRK

J. B. TAYLOR

The annual meeting of the board of directors of the California Natural Gasoline Assn. was held July 14. This was the occasion for the formal transfer of leadership of the association to W. A. Kirk, California Southern Oil Co., by Frank J. Colton, Tidewater Associated Oil Co., retiring president.

Mr. Kirk joined CNGA soon after its inception and has been active in its work since 1926. Having served on the board of directors for the past 15 years and in the capacity of vice president for the past year, Mr. Kirk is thoroughly acquainted with the conduct of the work of the association and with the problems of the industry.

Prominent Men Among Officers

Other officers elected were: J. B. Taylor, Signal Oil & Gas Co., vice president; Paul Armstrong, sales engineer; F. E. Bradley, C.C.M.O.; R. O. Boykin, Fullerton Oil Co.; L. P. Foote, The Ohio Oil Co.; P. E. Foote, Petrolane, Ltd.; R. E. Foss, Barnsdall Oil Co.; N. A. Rousselot, Seaboard Oil Co., and Leland K. Whittier, Belridge Oil Co., as directors. E. R. Millett, Jr. was reappointed as secretary-treasurer.

CALENDAR

All associations are invited to send in dates of their special and annual meetings for this calendar.

Sept. 8-10—LPGA Short Course. Pittsburgh, Pa.

Sept. 12-14—Southwestern Annual Convention and Trade Show, Oklahoma LP-Gas Assn. Skirvin Hotel. Oklahoma City.

Sept. 16—Pennsylvania LP-Gas Assn. Hersey Hotel. Hersey, Pa.

Sept. 16-18—National Petroleum Association. Atlantic City, N. J.

Sept. 18 — Council LP-Gas Associations. Michigan. (Tentative.)

Sept. 20—LPGA Board of Directors. Chicago.

Sept. 20-22—National Butane-Propane Association, National Convention and Trade Show. Congress Hotel, Chicago.

Sept. 26-28—Colorado Liquefied Petroleum Gas Association Annual Meeting and Trade Show. Shirley-Savoy Hotel. Denver.

Oct. — —LPGA Short Course. Colorado School of Mines. Golden, Colo.

Oct. 4—AGA Convention and GAMA Exhibition. Atlantic City, N. J.

Oct. 6-7—LPGA Board of Directors. Claridge Hotel. Atlantic City, N. J.

Oct. 7 — North Eastern District, LPGA. Claridge Hotel. Atlantic City, N. J.

Oct. 11-12—Kentucky LP-Gas Assn. Brown Hotel. Louisville.

Oct. 14-15—Missouri LP-Gas Assn. convention and trade show. Jefferson City.

Oct. 15—NGAA Regional Meeting. Fairgrounds. Shreveport, La.

Oct. 18-21 — National Safety Congress. Chicago.

Nov. 19-20—Montana LP-Gas Assn. Billings.

Louisville Dealers Form Group To Promote Bottled Gas

Voluntary cooperation for an efficient way to solve mutual problems was the idea in the minds of 11 bottled gas dealers of Jefferson (Louisville) county, Kentucky, when they recently formed a nonprofit corporation to promote "Bottled Gas."

"Local Bottled Gas Dealers" (Incorporated) has a 15 minute radio program each week day morning. This program gives details of the many advantages of bottled gas. One of the cooperating dealer's name and phone number is mentioned each day. To test the reception of the program, a slogan contest was in effect from July 12 to Aug. 30. The prize was a new, modern gas range (of the winner's choice up to $200), free installation if in Jefferson county and 2 cylinders of bottled gas.

Will Counter Electrical Advertising

The "Local Bottled Gas Dealers" feel that all bottled gas dealers should preach the advantages of this fuel to overcome the amount of advertising that the electric industry and electric stove manufacturers are doing.

Thomas B. Crutcher, Jr., "Pyrofax" gas and "Magic Chef" range distributor, is serving as president of "Local Bottled Gas Dealers"; Raymond Rains, "Dri Gas" distributor is vice president, and C. G. Keesy, Bottle Gas Distributing Co., is secretary-treasurer. Other members are 8 progressive bottled gas dealers of Jefferson county. Regular monthly meetings are held and all persons interested in the promotion of bottled gas and appliances are invited to join this cooperative movement.

New Mexico Association Elects Officers

Dave McCurdy and O. L. Garretson

By FREMONT KUTNEWSKY
Staff Correspondent

HOW to promote greater storage capacity among their customers and how to obtain adequate insurance protection for dealers were two unsolved problems discussed at the second annual convention of the New Mexico LP-Gas Assn. at the Hilton hotel, Albuquerque, Aug. 17-18.

Immediate action on the first point was promised by Dave McCurdy, McCurdy's Gas Service, Las Vegas, N. M., president of the association in the first year of its existence, who presided. Dealers will furnish lists of their customers and letters will be sent out in the name of the association from a central point. Then dealers will follow up with solicitation.

Paul B. Rubincam, of the New Mexico Association of Insurance Agents, told of efforts to organize a pool of companies which would provide dealers with adequate protection. He said butane-propane risks were new to insurance men, but that he felt sure some plan would be worked out to give them the coverage they need.

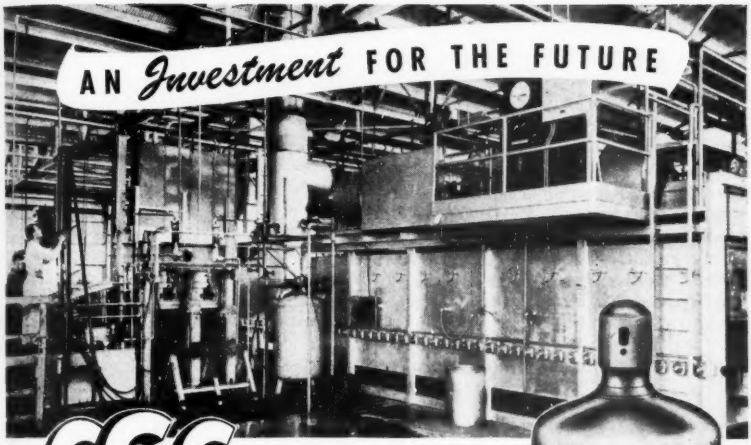
Cooperation of the New Mexico Public Service Commission is forthcoming to help in solving the industry's problems, Elmer F. Carter, chief of operations, said. Dealers can help themselves a great deal, he pointed out, in setting up and maintaining higher standards of safety. He said this would be a first step in becoming eligible for insurance. The greatest need is for adherence to safety regulations and employe education, in his opinion.

Approximately 100 dealers and allied trade representatives were registered, and the banquet and dance which topped off the convention the last evening were attended by 150 persons.

An outstanding feature of the convention was a mezzanine loaded with exhibits by 16 manufacturers and distributors of LP-Gas appliances.

Three items offered as door prizes at the banquet were received with acclaim by the winners: A 30-gal. Mission hot water heater; a Day and Night "Panelray" heater, and a Dearborn ventilated heater.

O. L. Garretson, vice president of Sacra Bros., of Roswell, who headed the committee working for greater



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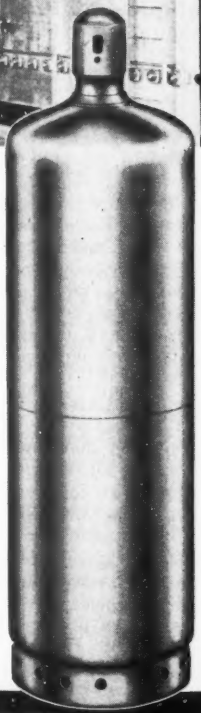
ICC 4B240 PROPANE CYLINDERS

Pictured above is the new CGC rapid action hydrostatic tester, and a partial view of the huge new dehydrating oven that assures you a really dry cylinder. This and other exclusive equipment is CGC's investment in the future.

When you buy a cylinder, you too invest in the future. The many extra and exclusive construction features of CGCylinders offer you repeated economies in the years to come.



CGC

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customer storage facilities, was elected president for the coming year. T. B. Watkins, of Roswell, also, was made vice president; Richard C. "Dic" Martin, of Butane Gas & Appliance Co., Albuquerque, was re-elected secretary-treasurer.

New directors elected were: J. S. Caudill, of Albuquerque; Earl Callens, of Tucumcari; M. C. Wyckoff, of Santa Fe. Other directors whose terms run another year are: T. A. Sacra, of Roswell; J. A. Ikard, of Las Cruces and Ben Clark, of Clovis.

Fuel Outlook is Better

Mr. Garretson discussed "Butane versus Propane" along similar lines to his article in the August issue of BUTANE-PROPANE NEWS. He said demand will set the price of LP-Gas, that the shortage will not be as bad this coming winter as last, and urged dealers to learn how to handle propane. More and more butane is going into gasoline, he said, and military preparedness might call for more of it. Technical developments, he said, would tend to decrease the output of butane and increase production of gasoline.

Representatives of Phillips Petroleum Co. and Skelly Oil Co. told delegates much the same story that appeared in an article by William J. Murray, Jr., in the August issue of BUTANE-PROPANE NEWS. "Buy more LP-Gas in summer or go short in winter."

Capin Carnes, of the Albuquerque Credit Association, pled for free use of credit by dealers as against controlled credit. He said American business grew up under freedom and can solve its own credit problems. "Credit is a mighty force for good or evil," he said. "Eliminate the evil by not overloading the customer."

Lyle Blanton, past president of the Texas Butane Dealers Assn., told of the cooperative insurance program being developed by dealers in his state, with the blessing of the public service commission. He said the $300,000 corporation would go slow, pick risks with care, regardless of who did or did not subscribe to stock. He thought this might help to "clean up" the industry in Texas.

R. F. (Bud) Hammock, of the George D. Roper Corp., Houston, Texas, gave a stimulating talk on retail selling. He showed a great deal of printed material that his company offers to help dealers with sales problems. His dramatized presentation was one of the highlights of the convention.

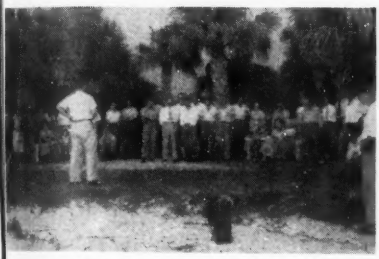
Cooperative advertising was discussed by Tom Gordon, of the Beals Creative Printers, Oklahoma City. James L. Bradley, executive vice president of the Colorado LP-Gas Association, Denver, described advertising plans of his association to build up year-round markets for LP-Gas.

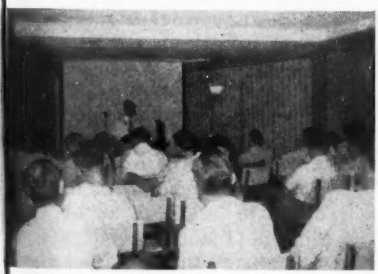
Rulane Gas Co. Opens New Plant in Marion, N. C.

The opening of a new plant in Marion, N. C., and the appointment of G. F. Moose of Charlotte as its manager was announced recently by W. S. Lander, president of the Rulane Gas Co.

Mr. Lander explained that the growing demand for Rulane Gas service had resulted in the company's expansion in the Marion area. The new plant will serve the territory formerly served by the Burleson Store Co. and extending from Banner Elk to Old Fort and from Linville to Burnsville. Dealers near to this territory also will be served by the plant.

Mr. Moose has been with Charlotte Rulane plant for some years.





Southeastern Dealers Attend Service School

GREEN'S Fuel, Incorporated held its second annual service school for its distributors from Florida, Georgia, North Carolina and South Carolina at the Orange Blossom hotel, in Sarasota, Fla., from July 12-16.

There were 61 service men present at this meeting and 20 engineers and technicians, representing 15 various appliance and equipment manufacturing concerns.

The school was under the direction of William J. Burkett, chief engineer of Green's Fuel, and he was assisted throughout the week by K. H. Koach, Taylor Green, and Frank Bennett, all of Green's Fuel.

Throughout the week, talks and demonstrations were presented on the proper installation and servicing of domestic ranges, gas refrigerators, water heaters, floor furnaces, "Panelray" heaters, unit heaters, thermostats, central heating plants, liquid gas meters, magnetic gas controls, regulators, carburetors, cylinder installations, and other types of LP-Gas equipment.

From top to bottom:

Al Flannes, Day & Night Manufacturing Co., discussing water heaters and "Panelray" heaters.

C. B. DeBerry, of Ansul Chemical Co., explaining type and size of equipment to use, and methods of fighting an LP-Gas fire.

Joe Cerny, of Bryant Heater Co., discussing water heater and heating equipment with a group of Green's Fuel servicemen.

Ike W. Pitman, of Neptune Meter Co., leading a discussion on liquid gas meters at service school.

POWER

Butane and Propane As Tractor Fuels

INVESTIGATION in recent years has indicated most conclusively that there are a number of worthwhile advantages in the use of LP-Gases for motor fuel. These advantages stem largely from their high antiknock qualities, thus making possible the use of high engine compression ratios resulting in increased power and lower specific fuel consumption (Fig. 1); but associated also with the use of a dry gas as fuel is the accompanying absence of crankcase dilution and substantial reduction of carbon formation within the power section.

FIG. 1. HEATING VALUES OF PROPANE, BUTANE, AND SEVERAL LIQUID FUELS

Fuels	*Btu's per Lb.*	*Btu's per Gal.*
Commercial propane	21,560	91,500
Commercial butane	21,180	102,600
Aviation gasoline (70° API)	21,000	122,650
U. S. motor gasoline (60° API)	20,750	127,600
Kerosene (42° API).....	20,000	135,000
Diesel oil (25° API)....	19,000	142,000

Laboratory test data on antiknock testing is not at all consistent and not a little confusing; however, Figure 2 indicates antiknock ratings of propane and butane by various test methods.

Scrutiny of Figure 2 shows clearly that substantial increases in compression ratio can be made providing engine design is such that the increased cylinder pressures and bearing loads can be safely withstood. At this point we should remind you that neither gain in power output nor reduced fuel consumption are straight line functions of increased compression ratio. In fact, although power increases and fuel economy improves in the order of 2% to 3% for each ratio increase at 6.0 to 8.0:1 compression ratio, the gain at 12.0:1 is reduced to less than ½ of 1% and there is virtually no advantage in increasing compression ratios beyond 15.0:1.

Most of the design changes incorporated in conventional engine models have provided the following basic features: compression ratio of 7.0:1 to 9.0:1, cold intake mani-

By E. A. JAMISON and J. R. STROTHER

Philgas Division, Phillips Petroleum Co., Bartlesville, Okla.

folds, optimum spark timing, cold spark plugs and, of course, LP-Gas carburetion equipment.

The 7.0:1 compression ratio is somewhat conservative even for straight butane which has the lower antiknock rating of the fuels under discussion. However, this provides a good starting point for development testing. 8.0:1 to 8.5:1 compression ratio appears to be the practical limit for butane and increases from this point require mixtures of propane in order to further raise the antiknock rating. The actual limit of compression ratio depends on engine design and the means by which the ratio is increased. For example, small high speed engines get by with higher ratios than do larger ones. Also, our experience indicates that L-head engines are less critical to variations in knock qualities of fuels but do not react as favorably from a power and fuel economy standpoint, as do valve-in-head engines.

FIG. 2. KNOCK RATING OF PROPANE

*Method**	*Ml. Tel in Iso-octane*	*Equiv. O.N.*
Research (F-1).....	1.90	111.8
ASTM (Motor)	..	97.1
F-3 (1-C)	0.08	101.7

*Reported by National Bureau of Standards

While 9.0:1 compression ratio is by no means the limiting point for propane for knock, it appears to be a practical limit from an engine life standpoint and also from a fuel cost standpoint. This latter

E. A. JAMISON

thought is based upon the fact that it is desirable to maintain an LP-Gas blend as high in butane content as possible, because as shown previously, butane has roughly a 10% greater heating value which results in 10% saving in fuel cost where butane and propane are sold at the same price per gallon.

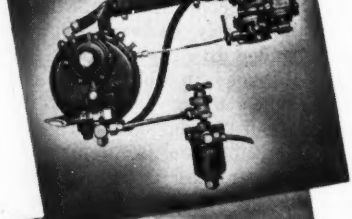
The use of cold intake manifolds is not absolutely necessary but is recommended in order to partially offset the loss in volumetric efficiency when using LP-Gas. With gasoline and the conventional gasoline carburetor, fuel is atomized in the air stream and is accompanied by a charge mixture temperature drop of as much as 40 to 50°F Using butane or propane in the dry gas state precludes taking advantage of this feature and therefore requires that the engine suffer in volumetric efficiency as much as 5%.

To partially counteract the effect of using a gaseous fuel, cold intake manifolding is used wherever possible. This is accomplished by removal of the heat box from the manifold and by attaching suitable shields to retard the

ENSIGN

BUTANE CARBURETION

Where Performance Counts



ENSIGN equipped trucks are today doing the toughest jobs. Getting there faster with the biggest pay loads at the least expense.

Results reported from thousands of ENSIGN installations in all parts of the country prove the practicability of Butane-Propane as an engine fuel—lower fuel costs, greatly reduced oil consumption and reduced engine maintenance.

ENSIGN, carburetor builders for over 36 years, offers a complete line of high-quality carburetion for every engine need. ENSIGN equipment sold and installed by qualified Ensign dealers is your assurance of economical and satisfactory performance on Butane-Propane.

- **CARBURETORS FOR BUTANE OR COMBINATION BUTANE and GASOLINE**

Write us for complete information. Our engineering staff is at your service.

ENSIGN

CARBURETOR COMPANY

7010 S. Alameda St., Huntington Park, California

Branch Factory: 2330 W. 58th St., Chicago 36, Illinois

radiation of heat from nearby exhaust piping. Further improvement in engine performance may be had by rigging the carburetor air intake to draw cold air.

While on the subject of the introduction of fuel in the dry gas state, it might be well to suggest that those interested give consideration to the use of LP-Gas by the pressure injection of liquid fuel. It is believed that because butane and propane are so readily vaporized their use would make fuel nozzle design far less critical, and because surprisingly little carbon is deposited with the burning of these fuels, nozzles would be much less inclined to clog up. These views are mere hypotheses, of course, since to our knowledge they have not yet been put to test.

The desirability of providing optimum spark timing is a feature which hardly needs discussion beyond the remark that because the fuels in question have high antiknock ratings, advantage should be taken of the increase in power and improvement in fuel economy available when advancing to optimum timing. Nor should the spark curve be expected to follow that for gasoline. The rate of flame propagation for LP-Gases is somewhat slower than for gasoline and experience has shown that optimum timing may be 5° to 10° earlier than the optimum for gasoline.

KNOCK RATINGS OF PROPANE AND BUTANE BY SIMULATED RESEARCH (F-1) TEST METHOD

Fuel	*Critical Comp. Ratio*	*Equiv. O.N.*
Propane ...	12.0:1	Iso-octane + 4.7cc
Butane	8.0:1	Iso-octane + 0.2cc

Data obtained in 1946

Cold spark plugs are recommended with LP-Gas in order to reduce the likelihood of the spark plug becoming a source of preignition within the combustion chamber. The higher cylinder temperatures accompanying an increase in compression ratio naturally tend to heat the spark plug and exhaust valve in excess of what would be expected at conventional ratios. The installation of the coldest plugs available will help in avoiding hot spots. Furthermore, hot plugs are not needed because lead accumulation and carbon formation are not problems.

Recapitulation

The subject of LP-Gas carburetion is one which is entitled to far more space than can be given in this brief paper. In review, however, it may be stated that all recognized LP-Gas carburetion systems consist of two or more units. Fuel leaves the high pressure container under its own vapor pressure and is piped through heavy wall tubing to a heat exchanger unit. At this point heat is absorbed from the engine cooling water and vapor pressure is reduced to some intermediate valve by a diaphragm actuated pressure regulator. Further heat is absorbed by the vapor and a second stage of pressure reduction takes place.

By now, the fuel is a dry gas

and its pressure is slightly less than atmospheric, so that venturi suction is required to introduce it into the engine. The carburetor, itself, is a simple mixer consisting of a metering device, such as a venturi, to proportion the air and fuel; the fuel entering the air stream through a fuel tube or through ports in the venturi.

The above is, of course, a very curt description of the equipment available. There are many variations and refinements thereto. Some reduce to the final pressure in but one stage while others recommend three stages of pressure regulation. Several manufacturers provide a positive lockoff device to eliminate gas leakage through the mixer when the engine is off, which means that starting can be accomplished only by mechanically opening the lockoff. Others depend upon the seating of the final stage gas regulator for fuel shut off. Refinements to carburetion equipment have been made to the point that it may now be said with reasonable safety that little is to be gained in engine performance from further improvements in the present system of carburetion. The goal for which carburetion equipment manufacturers are now striving is that of greater standardization and interchangeability of parts and the lowering of costs.

Before leaving the subject of the desirable design changes which should be incorporated in an engine using LP-Gas fuel, we might bring up the subject of top cylinder lubrication.

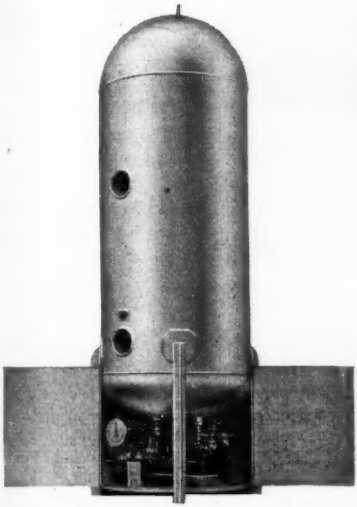
The need for special lubrication depends entirely upon the type of service to which the engine is put. For most automotive applications where the power plant is operated at reasonably high speeds, such as with trucks and tractors, oil control is maintained by the piston rings and the power section can be changed through a wide range of dryness or oiliness at the discretion of the engine designer. Under these circumstances a top oiler is considered unnecessary.

On the other hand, many applications, such as stationary units, involve long idling or part throttle operation. With LP-Gas, the latter results in a severe drying effect which may be overcome through the use of a top cylinder lubricator.

We sincerely believe that the advantages which propane and butane possess as excellent motor fuels and the interest of distributors of these fuels in developing summertime uses for the products, will result in a greatly increased demand for LP-Gas fueled tractors.

Mobile Dispenser Will Aid Contractors, Highway Stations

The dispensing unit shown in the accompanying picture will be of great service to operators of power equipment burning LP-Gas and to highway service stations that supply fuel.



It can be quickly set up or moved and is particularly adaptable to operations of large contractors, oil well drilling, irrigation pumping, and farm usage.

The unit holds 1500 gals. and is made by the Ransome Co., Emeryville, Calif.

Le Roi Announces High Power, Muti-Fuel Engine

Newest of the Le Roi Co. engines is the H-540, a V-8, valve-in-head

PROFITS!

PROFITS!

PROFITS!

Profits increase when you sell DIX LP-Gas Carburetion Units. This is true because the DIX unit is the simplest to install, the easiest to adjust.

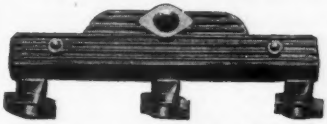
Dealers who have turned to DIX report greater profit ratios—more satisfied customers—more demand for LPG as a motor fuel.

Because of increased production DIX Units are now available for immediate delivery

DIX MANUFACTURING CO.

3447 E. Pico Blvd. Los Angeles 23, Cal.

FOR BETTER CONVERSIONS

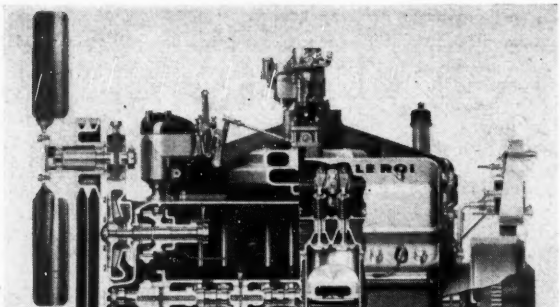


Make every conversion a better installation by using an Ellis Manifold designed especially for LP-Gas. Your customers will find they get more power and mileage . . . and you will get more customers.

Ellis "Bu-Power" Manifolds have been tested and proven by hundreds of successful installations.

ELLIS MANIFOLD CO.

1708 S. Soto St. Los Angeles 23, Calif.



Cutaway view of new 135 h.p. LeRoi engine which burns butane, natural gas or gasoline.

unit providing extreme flexibility with speeds up to 1800 rpm.

Designed to meet high speed requirements, the new H-540 engine provides smooth power throughout the speed range with conservatively rated horsepowers up to 135.

The H-540 is compact, easily accessible and light in weight despite the horsepower range. It has the strength to withstand the strains of continuous heavy duty service.

This engine runs on gasoline, butane or natural gas, a feature common to all Le Roi engines. This fuel adaptability provides low consumption based on fuel availability, lower operating costs and trouble-free performance.

The valve-in-head design simplifies maintenance by providing greater accessibility. It reduces maintenance costs and fuel consumption, and produces more power.

The H-540 has been thoroughly tested and developed for limitless applications in the industrial, construction and oil fields.

Features incorporated in the new Le Roi engine are removable, wet-type cylinder sleeves; extra-heavy, counterweighted crankshaft; unit construction of crank-case and cylinder block; water-cooled manifolds; full-pressure lubrication; gear-driven water pump; modern cam-ground aluminum pistons; and push button electric starting.

Specification sheets are available for the standard oil field power unit and the standard industrial power unit. They may be obtained by writing to the Le Roi Co., 1706 S. 68 St., Milwaukee, Wis.

Supply Outlook for 1948, 1949

LP-Gas Committee of National Petroleum Council Digs Deep Into Production, Demand and Transportation Potentials

RESULTS of a study of LP-Gas production, demand, and transportation, made by the Committee on Liquefied Petroleum Gas of the National Petroleum Council, was released recently.

The problem was divided for study among three subcommittees. The results of their analyses appear below in tabulated form. All committees qualified their reports with explanations of the difficulties of ascertaining such moot potentials as the amount of steel to be allocated to the industry, extent of refinery expansion, and incomplete estimates of production by producing concerns.

I. Production committee report.

A. This committee found it advisable to work in cooperation with the production subcommittee of the NPC's steel requirements committee, in making up its report.

1. It found, through questionnaires, that about 57 new projects are under consideration in 10 states (37 in Texas).

a. The committee found that these 57 projects will increase annual capacity as follows (excluding California and Pennsylvania):

	gals. per yr.
Butane	353,800,000
Propane	333,547,000
LPG	425,492,000
Total	1,112,847,000

2. An estimated 60% of this total (667,708,200 gals.) will be installed by the end of 1948.

a. Assuming that these facilities are operated at 80% capacity, annual production will be upped by 534,159,000 gals. by the end of 1948 and another 445,132,800 gals. by the end of 1949.

b. These figures indicate that LP-Gas production from natural gasoline and cycling plants will be about 2,423,700,000 gals. annually by the end of 1948 and 2,868,800,000 gals. by the end of 1949.

1. Percentagewise, the figures show:

28% increase in 1948 over 1947.

51% increase in 1949 over 1947.

18% increase in 1949 over 1948.

3. Questionnaire returns plus 1947 Bureau of Mines production reports show the following minimum volume of LP-Gas from refinery sources:

1948 estimated total from refineries for fuel and chemistry—839,198,600 gals.

1949 estimated total from refineries for fuel and chemistry—892,270,600 gals.

4. Consolidating, total LP-Gas production for the two years will be about:

End of 1948: 3,263,881,600 gals.

End of 1949: 3,771,866, 600 gals.

II. Demand committee report.

A. Avoiding duplication of effort, the committee worked with, and ac-

cepted results of, a subcommittee of the marketing division of the National Petroleum Council, which was researching much the same material at the same time.

B. Demand for LP-Gas, although closing rapidly to production, will still be less than total production as estimated.

1. Demand found to be as follows, 1948: (at year-end) 3,194,102,000 gals.

1949: (at year-end) 3,755,220,000 gals.

2. Refinery demands were not included, since a majority of estimates were not obtainable.

C. Keeping in mind the qualifications imposed on all estimates by unpredictable future demands for automotive consumption, etc., the demand committee concluded that:

1. Production will stay slightly ahead of demand on an annual basis, but seasonal peakload demands may not be met by adequate production.

2. Tank car production should be great enough to meet requirements.

D. The committee recommended increased storage facilities both for distributors and consumers, since large amounts of LP-Gas which are produced in excess of slack-season demands must be saved to meet peakload winter demands. Production, it pointed out, remains constant, and cannot be increased to meet increased demand at a given time. Distributors should minimize sales of tanks having sizes insufficient to hold 90 days' peakload supply, and consumers should not install equipment until solid contracts with reputable dealers insure them against serious winter shortages.

III. Transportation committee report.

A. Sufficient tank cars will be produced in 1948 and 1949 to meet higher demand for them.

1. In 1947, approximately 50% of LP-Gas was transported by tank car.

a. If 50% is to be transported by that method in 1948, increased car production must be about 1338 cars.

1. About 3000 cars are expected to be built in 1948.

2. War-built cars that are losing efficiency may be completely taken from service in 1949.

3. Enough tank trucks are under construction and on order to meet increased demand.

B. Committee report was designed over the overall, national picture. Some difficulty is seen to be imminent among individual companies in obtaining tank car or truck service.

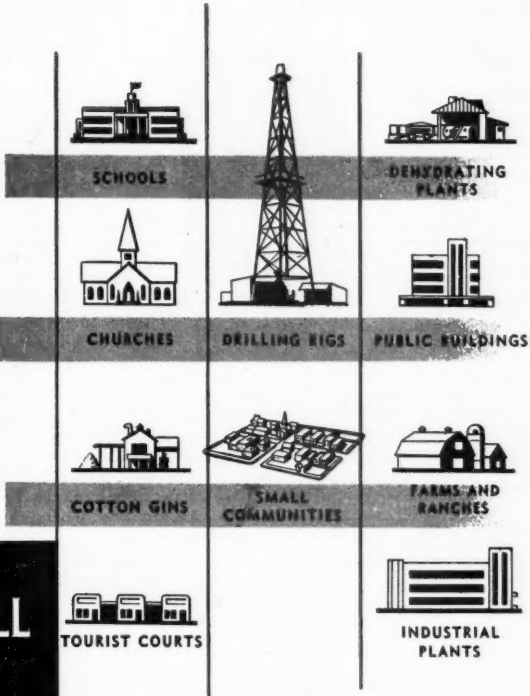
Shipments of LP-Gas Ranges Lead the Field in May

Unit shipments of domestic gas ranges in May, 1948, increased 29.0% over the same month in 1947, according to reports from companies representing 70% of the industry, says the American Gas Assn. in a recent bulletin. For the first five months of 1948, unit shipments were 24.3% greater than during the same period last year.

Unit shipments of gas ranges for use with liquefied petroleum gas in the first five months of this year were 28.2% higher than a year earlier and constituted approximately 26% of the total shipments.

During the twelve months ending May 31, 1948, reporting companies shipped 1,819,280 domestic gas ranges with a total manufacturers' value of $174,029,000. Unfilled orders for domestic gas ranges on May 31 last totaled 316,844 units.

the all purpose



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The MITCHELL Industrial Model consistently delivers uniform pressure gas of constant heating value. It also prevents loss in storage tank pressure due to withdrawal of gas. Not because of a multiplicity of safety devices but because of a unique and scientifically sound principle, the MITCHELL Vaporizer is efficient, economical and safe.

Dependable, minimum maintenance MITCHELL Vaporizers are available in capacities from 2 gallons to several hundred gallons per hour. The Industrial Models are designed for the medium and larger service demands and offer reliable, economical gas supply—regulated to any desired pressure—to a variety of applications among which are those illustrated above. Where desired, the vaporizer can be equipped with controlled automatic feed back for pressurizing the tank. For details, write or wire

JOHN E. MITCHELL COMPANY

Manufacturers of Fine Machinery for over *Forty Years*

DALLAS, TEXAS

Glenn McGuire Will Manage Six Kansas Bulk Plants

GLENN McGUIRE

Glenn O. McGuire has accepted a position with Union LP-Gas Systems, Indepence, Kan., as general manager in charge of the company's LP-Gas business at its six bulk plants. Mr. McGuire will maintain headquarters in Iola, Kan.

A graduate of the University of New Mexico, Mr. McGuire has had considerable experience in the industry, having been associated with the Dix Petroleum Co. prior to joining Union.

Richard H. Derry, Protane Corp., Passed Away July 21

Richard H. Derry, advertising manager for the Protane Corp. and the American Gas Service, Erie, Pa., died July 21 in his Erie home. Mr. Derry started work with the Protane Corp. in 1926, shortly after it was organized, and was instrumental in forming its eastern sales organization.

In 1942, he took a leave of absence to enter American Red Cross service and spent three years as a field director.

Bill Shipley Buys Butane Business in Poteau, Okla.

Bill Shipley, who has been manager of the Poteau, Okla., plant of the Gains Butane Equipment Co. for some months, has purchased the business, it is announced. The Gains home office is in Okmulgee, Okla.

Mr. Shipley, who is also a state representative, will install a large bulk storage plant at once.

Oregon LP-Gas Men Given Examinations by State

Oregon's "Bureau of Labor" gave a compulsory examination Aug. 16 to all men within the state who handle LP-Gas installations. Frank Smith was in charge.

Twenty-seven questions were submitted to the men and it required approximately 1½ hours to answer them. All were based upon NBFU Pamphlet No. 58, plus queries covering proper methods of threading and installing pipe, proper pipe size and fundamentals involved in converting ranges, water heaters and other gas appliances from natural or manufactured gas to butane or propane.

Hudson Co. Appoints Columbus Branch Manager

A. E. Miller has been appointed Manager of the Columbus, Ohio, branch of the Hudson Equipment Co.

Mr. Miller brings to the Ohio area extensive experience in the farm equipment field, having been associated for many years with the company's Chicago office.

Butane Firm Opens Branch Office in Mississippi

Sanders and Fruge, butane dealers of Meridian, Miss., have opened a branch office in Starkville, Miss.

The new headquarters will be under the management of D. B. Sanders, with Fred Clardy, associate. LP-Gas, appliances and equipment will be handled.

QUALITY

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1ST

PRESTIGE

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A. O. Smith was first to develop a practical, economical water heater with a tank of glass-fused-to-steel... *it CANNOT rust or corrode* ... most important advance in water heater performance since the first storage water heater.

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A SMITHway WATER HEATER*

FIRST IN MERCHANDISING, too ... A. O. Smith was the first manufacturer to design and build a premium quality product which has gained nationwide prestige and public acceptance through *the* unprecedented advertising and sales promotion program in the water heater industry. Consistent national advertising in the leading consumer magazines ... Life, Post, House Beautiful, Better Homes and Gardens, American Home, and others ... plus a complete array of merchandising materials, backs up your sales plan and means bigger profits for you with *"Permaglas."* Why don't *you* be *first* in your community to take advantage of this unusual profit opportunity and "cash in." Get the facts with the coupon below ... now!

Alert Dealers

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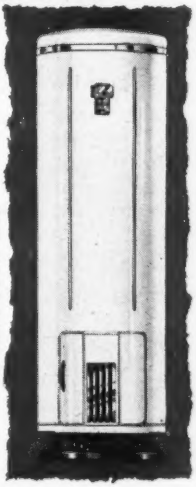

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*Also quality zinc-lined *Duraclad* and *Milwaukee* Water Heaters

PRODUCTS

Light Weight Cylinder

The Weatherhead Co., 300 E. 131st St., Cleveland.

Model: 20-Lb. Cash-and-Carry.

Description: These light weight cylinders are made for use with butane, propane, or any LP-Gas mixes. They are made of NAX steel of 60,000 psi tensile strength, and comply with ICC 4BA240 specifications. They can be used singly or in multiple units. Each is stress relieved, hydrostatically and air tested, and X-ray controlled. Interiors are thoroughly cleaned and dehydrated and the exteriors are given a coat of gray lacquer.

The cylinder can be furnished with a ¾-in. female pipe thread for standard POL valves 136 and 147, or a 1-⅜-16 straight thread for cash and carry valve No. 131.

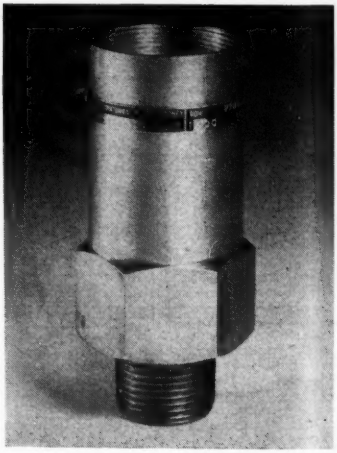
The height of the cylinder is slightly over 18 in., and the inside diameter is 12 in. Tare weight, approximately 23 lbs.

Relief Valve

L. C. Roney, Inc., 1511 W. Florence Ave., Inglewood, Calif.

Model: Roney N. 2105 Series.

Description: This series of relief valves is of the ¾-in. pipe size. All valves of the series are listed by Underwriters' Laboratories, Inc., and each valve carries the Laboratories' label which is marked to show the series number, the date the valve was



set, the "container type," ASME "U68-U69," API-ASME; the start-to-discharge pressure setting and the rate of discharge in cubic feet per minute of LP-Gas. Example: Roney 2105GH, 7-48, T200, ASME (U68-U69), API-ASME, 250, 1750. The first suffix letter to the series number designates the "Container Type" service, B = 100; C = 125; D = 140; E = 150; F = 175; and G = 200. The second suffix letter designates the start-to-discharge pressure setting as permitted by Pamphlet No. 58, "L" being the lower setting which is equal to the minimum design working pressure for an ASME Code (U68-U69) container, and "H" the higher setting which is equal to the minimum design working pressure for an API-ASME Code container. The higher setting is recommended when acceptable to local inspection authorities, for even with the higher setting the valve opens to give maximum flow before the pressure reaches 120% of the "H" setting.

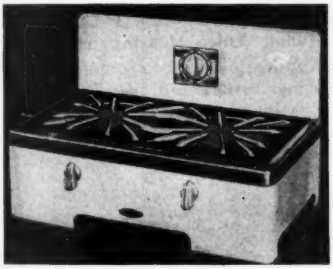


Table-Top Range

Meynell Manufacturing Co., Erie, Pa.

Model: Meynell Xtra-Range.

Description: Manufacturer claims the stove to be ideally suited for camp, small apartment or basement. The stove is available in both aluminum and porcelain stove bodies. It is equipped with a signal timer that can be set for periods up to one hour, and two Meynell super-star burners, tested and approved for LP-Gas use. Measurements: 20⅝ in. x 12¼ in. x 12¼ in. Weight: 21 lbs.

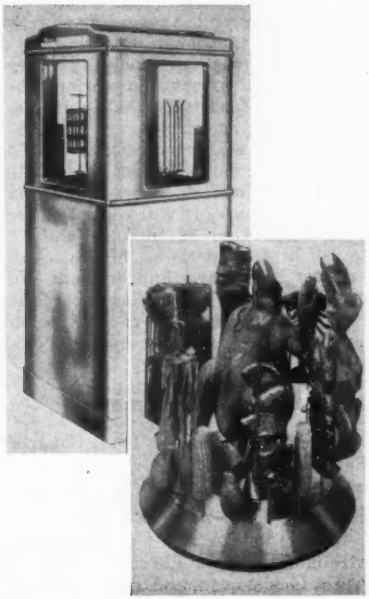
Commercial Cooker

Standard Gas Equipment Corp., Baltimore 30, Md.

Model: Vulcan Flavorizer.

Application: For commercial cooking of all foods.

Description: This cooker is a completely new addition to commercial cooking facilities. It is 28½-in.



square and 69-in. high. It is fabricated of high-finished stainless steel and polished aluminum and has four large windows of heat-resistant glass through which all cooking operations may be viewed.

Foods of various types (meats, fish, fowl, vegetables) are placed on spits or in food holders of appropriate design. The holders are inserted into receiving holes in a slowly revolving platform at the base of the cooking chamber. As the platform revolves the food holders also move on their own axes, thus permitting the food to be exposed at all times to the heat from four radiant burners placed in the corners of the machine. As food is bathed in thermostatically controlled heat, the fats, tallow, and indigestible greases are removed from the hot zone into two collecting pans in the cool zone directly below the cooking area.

Many different types of food may be cooked at once, it is said. Individual foods may be removed as they are cooked, without impairing the cooking of foodstuffs that must remain in the cooker longer. The machine offers a shorter cooking period for many common items. A 20-lb. turkey or ham will be cooked in about 1¾ hours. It will cook 27 2- to 3-lb. broilers in 32 minutes and 36 to 54 beef tenderloins in 10 to 15 minutes. Quality improvement in cooking in the "Flavorizer" is claimed to be a result of cooking in natural juices without basting.

Oven Thermometer

Assembly Products, Inc., Chagrin Falls, Ohio.

Application: For judging oven temperature without opening door.

Description: A small thermocouple wire is designed of sufficient length to reach inside oven and pick up temperature for transfer into degrees on the outside meter. The meter is fully compensated for accurate measurements. Both Fahrenheit and Centigrade are shown on the dial. Range is 0-750° F and 0-400° C.

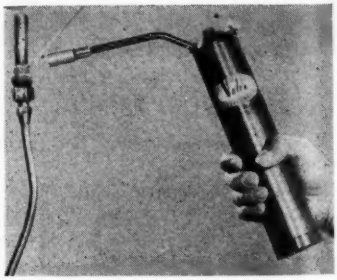
Heating Torch

Furlo Sales Co., 521 N. La Cienega, Los Angeles.

Model: Vulco Heating Torch.

Application: As a general utility heating torch; for use on hard or soft solders.

Description: This new torch weighs 2-lbs. and is said to burn about 12



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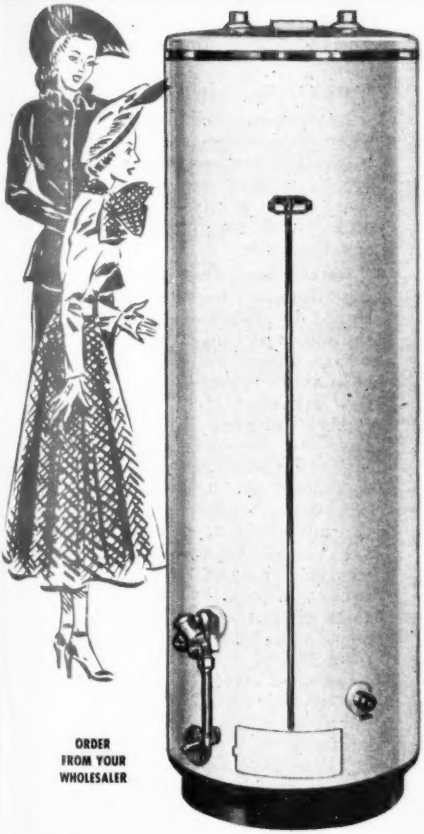

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WILSHIRE Water Heaters have the new look, PLUS! These popular base models of shining, extra-heavy enamel with gleaming chrome trim are easy on the eyes . . . and easy on the check book too. At present day prices, Wilshire Water Heaters are one of the best and most economical investments a home owner can make. Operating costs are low, yet advanced engineering design has given these water heaters the highest reheating capacity per hour ever attained . . . a decided advantage in the operation of many modern appliances. You will be proud to install Wilshire Water Heaters.

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Southern Heater CORPORATION

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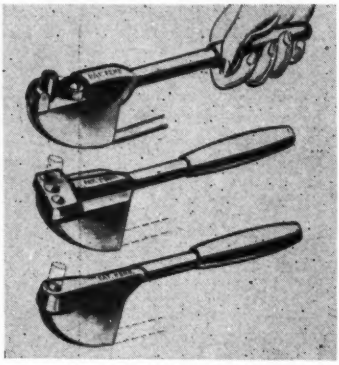
hours. It is a general utility heating torch to be used for soldering, leading, or light brazing. Its diameter is 2¼-in.

There is no hose and preheating is not necessary. It will burn in any position without overheating, maintaining its calculated flame temperature of 3660° F. There are no moving parts.

The torch has successfully passed rigid safety tests by Tripplett and Barton, Inc., testing laboratories of Burbank, Calif., and a blanket underwriter contract is carried on the torches with Lloyds of London. Price of the torch is $17.50.



Tube Benders

Keiner Machine Products, 6015 W. Third St., Los Angeles.

Models: Bob's Tu-Benders.

Application: Commercial or domestic bending of small tubes.

Description: Three tube-bending models that are said to be highly efficient for bending of tubes ⅜ in. to ⅞ in. without kinking. Each model is available in varying sizes.

"Bob's all-purpose bender" (center) is designed for ⅜-in., 7/16-in., and ¾-in. OD tubing. Price: $3.75.

The latch bender (top) is made in three sizes for flared tubing of ½-in. or ⅝-in. OD ($3.75), and ⅞-in. OD ($4.50).

A hip-pocket or tool kit model tool (bottom) is available for 7/16-in. or ¾-in. OD, and is priced at $2.50.

Soldering Iron

Mutual Liquid Gas Equipment Co., 3600 W. Imperial Hwy., Inglewood, Calif.

Model: No. 3 and 3A.

Application: For use with LP-Gas wherever soldering iron is needed and is excellent for continuous line soldering as it does not have to be exchanged for hot iron every few minutes. Good for light soldering of any type.

Description: This gas-fired soldering iron is designed to replace the old type iron which must be reheated every few minutes if correct temperature is to be maintained. It operates at a constant, ready temperature at all times. The iron should be of interest to all sorts of craftsmen, plumbers, tinsmiths, electricians, and sheet metal workers because of its suitability for spot soldering due to its light weight.

New Plant Will Increase LP-Gas 150,000 Gals. Daily

A new natural gasoline plant, now being built in Hockley county, Texas, will produce approximately 250,000 gals. of liquid products daily, of which 100,000 gals. will be natural gasoline and 150,000 gals. butane and propane.

The plant, owned by a group of oil and refining companies, will be operated by Stanolind Oil & Gas Co.

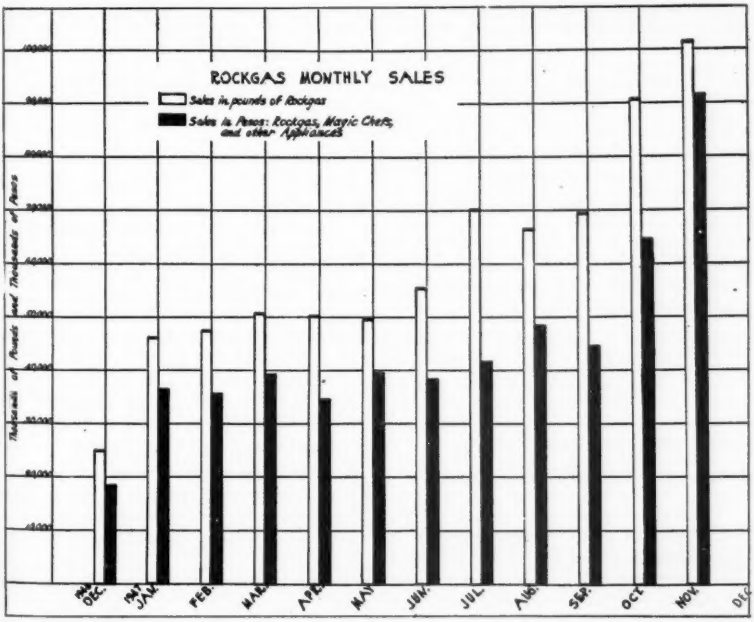
Flashing Neon Lights Tell Philippinos About LP-Gas

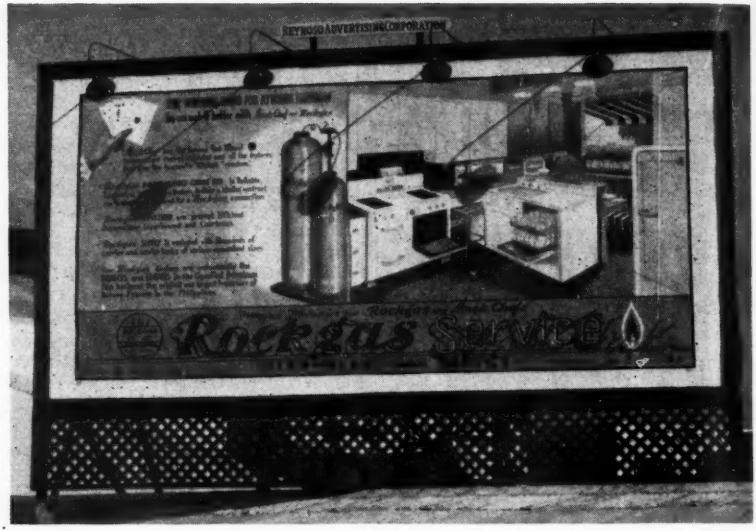
Among modern merchandising methods applied by the Inter-Island Gas Service, Quezon City, Philippines, is a Neon-lighted billboard advertising "Rockgas" and the "Magic Chef" range. It is displyed in a prominent location along the Quezon bridge in Manila.

The first flash in red says "Rockgas"; then this goes out and the second flash that comes out says "Magic Chef" in blue color. This also goes out and then the third flash that comes out says: "Rockgas Service" in red and green colors, respectively.

Business was good for Inter-Island last year, as the accompanying graph will show. Volume sales climbed steadily from about 25,000 lbs. for December, 1946, to 115,000 lbs. in November, 1947. The total volume for the 12 months preceding last December was 718,700 lbs.

Inter-Island Gas Service, managed





This billboard, advertising the fuel and appliances sold by Inter-Island Gas Service, Philippine Islands, is enlivened by changing neon lights in different colors.

by Andres Borromeo,* is also a member of the newly organized Philippine Safety Council under the direction of Ex-Mayor Frank S. Tenny. Mr. Borromeo has set up a three-months' safety training campaign to make his personnel safety-conscious about the LP-Gas industry.

* After this story was received Mr. Borromeo passed away. (See BUTANE-PROPANE *News*, June issue, Page 296.)

Louisiana Group Honors Moss for LP-Gas Services

Forty-four individuals and firms interested in the LP-Gas industry in Louisiana paid tribute to W. U. Moss, Sr., who served more than six years as director of the Louisiana Liquefied Petroleum Gas Commission, being the first director under the law creating the commission.

A group met Saturday night, July 24, and presented Mr. Moss with a pair of matched traveling bags, a gold watch and a contribution for vacation expenses. Each individual present expressed his personal views of the work and service rendered by Mr. Moss, and the universal feeling was that he did an outstanding job for the LP-Gas industry in Louisiana.

The presentation was made by Dr. T. Waldo Morgan; the group present being George A. Vollman, W. A. Keller, Lee Miller, Frank Anzalone, Edgar R. McCormick, Johnny Sims, L. C. Parker, R. W. "Bob" Anderson, Quentin Jones, Nolan C. Moore and D. W. Smith.

The "Concentrator" burner imparts a lively triple action to the flame—it travels (1) inward, (2) outward, and (3) around, in a swirling motion.

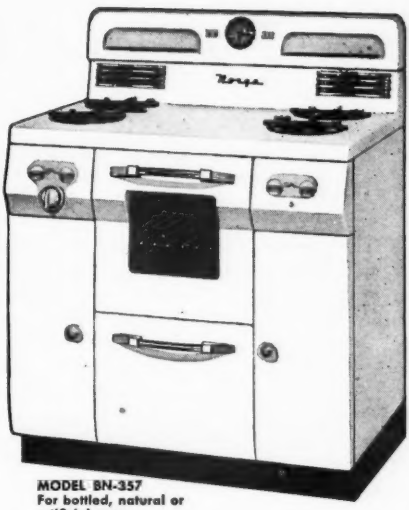
ONLY ON THE

NORGE

LP GAS RANGE

WILL YOU FIND THE FAMED

"CONCENTRATOR" BURNER



MODEL BN-357
For bottled, natural or artificial gas

FLAME TRAVELS IN. Port openings are on the *inside* of the burner ring—the flame first travels inward, toward center of cooking utensil.

FLAME TRAVELS OUT. After arriving at center of utensil, flame *bends* and travels *outward*, thus double exposing the utensil to its heat.

SWIRLING ACTION. Angle-cutting the ports at 45° imparts a swirling, wiping action to the flame as it travels first inward, then outward.

The direction and control of the gas flame in this new burner are such that virtually all of the heat is concentrated *under* the cooking vessel—none is wasted up the sides. Hence, an entirely new thermal efficiency is achieved.

In other features, too, this newest Norge is outstanding. Oven is of the one-piece, tank-type construction; insulation is extra-thick layers of Fiberglas; the new "contour" design is a pleasing departure from conventional practice; center oven (in the Model BN-357) with double-glass window in door is a sales-getter; two-deck, locker-type utensil compartments call forth great enthusiasm; a warming drawer can double for extra storage space.

All in all, the new Norge *"Concentrator"* LP gas ranges are the "big news" for 1948. They are easy to sell . . . hard to compete with. Norge Division, Borg-Warner Corporation, Detroit 26, Michigan. In Canada: Addison Industries, Ltd., Toronto, Ont.

A BORG-WARNER INDUSTRY

Refrigerators • Electric Ranges • Water Coolers
Washers • Electric Water Heaters • Home Heaters
Gas Ranges • Home Freezers

SEE NORGE BEFORE YOU BUY

Transfer of LP-Gases

By DEWEY THOES*

Superintendent of Gasoline Plants, Cities Service Oil Co., Wichita, Kansas

THE purpose of this meeting will be to discuss more efficient ways of getting products from one container to another; or how to transfer products faster and with less loss of products and with less danger to the men and equipment involved in the transfer.

Before we can go very far with such a discussion it will be necessary for us to review some of the characteristics of the products we are going to transfer.

Butane is a colorless, clear liquid, with a Reid vapor pressure of 54 pounds absolute, or about 40 pounds above atmospheric pressure, at 100° F. The liquid weighs 4.86 pounds per gallon and boils at 31.1° F. under atmospheric pressure. The heat of vaporization is 166 Btu per pound.

Propane is also a clear, colorless liquid and has a Reid vapor pressure of 188 pounds absolute or 174 pounds above atmospheric pressure at 100° F. The liquid weighs 4.24 pounds per gallon and boils at —43.8° F. under atmospheric pressure. The heat vaporization is 180 Btu per pound.

Liquefied petroleum gas is composed principally of butane and propane, either separately or in mixtures. It will also probaly contain an appreciable amount of isobutane and a small amount of ethane and pentanes. For the purposes of our discussion we can say that the characteristics of isobutane are very near to those of normal butane and the small amounts of ethane and pentanes will be disregarded as far as possible.

Tte last characteristic mentioned above (heat of vaporization), is important enough to warrant a little explanation. HV is the amount of heat necessary to change one pound of the liquid into the vapor state without any change in temperature. Starting with one pound of butane at 0° F. temperature, we know that if we want to raise its temperature we will have to add heat to it. For each degree that we raise the temperature of this pound of butane we will have to add about .55 Btu of heat. If we continue to add heat, the temperature will continue to rise until it reaches a temperature of 31° F. and then it will remain the same until all of the liquid is evaporated.

It will be at this temperature of 31° F. that we will begin to notice bubbles rising in the liquid and we

*Presented at the Kansas LP-Gas Service School, Wichita, Kan., Feb. 24.

WHEN you handle the Dearborn line of gas heaters, you have the backing of the strongest national advertising ever given any heaters—advertising that reaches into the farthest corners of the nation to tell the Dearborn story.

The best national magazines...the best regional newspapers...the most-listened-to radio stations...through the mails...at the point of sale—everywhere that potential heater buyers turn, they see and hear the name of Dearborn.

This national recognition of the Dearborn name is strengthened by "person-to-person" advertising—for more than 1,000,000 satisfied Dearborn owners just can't help telling their friends what a marvelous heater they have.

This constant repetition of the Dearborn story from coast to coast...PLUS the fact that Dearborns really *are* better heaters...PLUS the stability of Dearborn's price structure...PLUS the complete selection offered in the Dearborn line...has put Dearborn at the top of the list in dollar volume of gas heater sales. Why not let Dearborn make money for *you* this year?

YOU'LL SELL MORE DEARBORNS—BECAUSE DEARBORNS HAVE MORE TO SELL!

To learn how you can make real profit out of heaters this year, write TODAY to

DEARBORN STOVE COMPANY

1700 West Commerce Street
Dallas, Texas

BRANCH OFFICES

Merchandise Mart
Suite 1490
Chicago, Illinois

3625 South Grand Avenue
Los Angeles, California

1735 Stout Street
Room 114
Denver, Colorado

718 Avenue Q
Lubbock, Texas

Ronnyson Building
347 Carondelet
New Orleans, Louisiana

P. O. Box 1134
Omaha, Nebraska

1101 Mulberry Street
Room 202
Kansas City, Missouri

Merchandise Mart
1355 Market Street
San Francisco, California

151½ East Reno Street
Oklahoma City, Oklahoma

285 West Trigg Street
Memphis, Tennessee

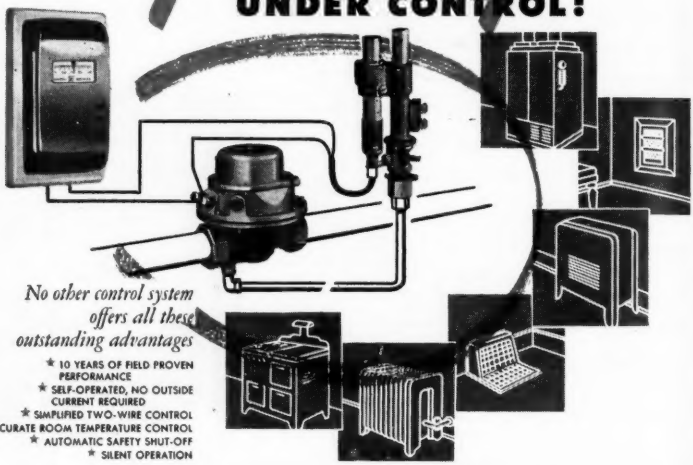
209 South Franklin
Tampa, Florida

1738 Sycamore Street
Columbus, Ohio

Dearborn THE WORLD'S FINEST, SAFEST GAS HEATERS

Completely

UNDER CONTROL!



No other control system offers all these outstanding advantages

★ 10 YEARS OF FIELD PROVEN PERFORMANCE
★ SELF-OPERATED, NO OUTSIDE CURRENT REQUIRED
★ SIMPLIFIED TWO-WIRE CONTROL
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★ AUTOMATIC SAFETY SHUT-OFF
★ SILENT OPERATION

THE NEW 500 M. V. B-60 COMPLETELY SELF-CONTAINED AND SELF-OPERATING CONTROL SYSTEM *ORIGINATED* BY GENERAL CONTROLS

For natural, manufactured or L P gases. For all kinds of domestic, commercial and industrial applications. System consists of the B-60 pilot operated diaphragm type gas valve, the T-70 Series Snap-action Thermostat, which is scientifically correct in design, and the new improved ingenious PG-9 Pilot Generator which produces 450 to 500 millivolts of operating current, safety control, and main burner ignition. The B-60 Series of controls have set new standards throughout the gas industry. For complete specifications on the GENERAL CONTROLS broad line of Automatic Pressure, Temperature and Flow Controls, request new Catalog and Service and Instruction Manuals.

Automatic, Safe, Silent and Self-Operated

GENERAL CONTROLS

Manufacturers of Automatic Pressure, Temperature & Flow Controls

FACTORY BRANCHES: Birmingham (3), Boston (16), Chicago (5), Cleveland (15), Dallas (2), Denver (10), Detroit (8), Glendale (1), Houston (2), Kansas City (2), New York (17), Philadelphia (40), Pittsburgh (22), San Francisco (7), Seattle (1) • **DISTRIBUTORS IN PRINCIPAL CITIES**

say that it is boiling. If we should stop adding heat when the temperature of the liquid reached 31° F. there would be no bubbles and no boiling, and no vapor would be formed. It is this heat that we must add to the liquid to cause it to turn to vapor while the temperature is remaining at 31° F. that is called the heat of vaporization. As a corrolary to the above we may say that if heat is added to the liquid there will be a rise in temperature or if the boiling point has been reached, a change from the liquid state to the vapor state.

Must Consider Vapor Pressure

The vapor pressure of the liquid in question is another important property to be considered when we start to transfer the product from one container to another. The VP at any particular temperature may be defined as the pressure under which the liquid will boil at that temperature. As an example, if we have butane under atmospheric pressure and at a temperature of 31° F., it will boil if heat is added, but if we apply a little more pressure the boiling will cease until the temperature has risen to the boiling temperature corresponding to that pressure. If we continue to increase the pressure, no matter how small the increases, we will get a stoppage of the boiling until the temperature has risen an amount equivalent to the rise in pressure.

Stated a little differently, for each pressure there is a different boiling temperature; and for each boiling temperature there is a different pressure. Tables are available that will give the vapor pressure of the hydrocarbons in which we are interested for any temperatures we might encounter. I use a table prepared by Norman K. Rector which gives the VP of the paraffin hydrocarbons from methane to decane, between the temperatures of zero and 600° F.

Our next consideration will be to list the containers from and to which products are to be transferred.

1. Bulk storage tank to bulk storage tank.
2. Bulk storage tank to truck tank, and vice versa.
3. Bulk storage tank to tank car, and vice versa.
4. Truck tank to domestic tank.
5. Bulk storage tank to cylinder.
6. Domestic tank to tractor fuel tank.
7. Miscellaneous occasional transfers which may or may not be legitimate or acceptable practice.

In all the above cases one or more tanks may be involved at either end of the transfer.

The first three cases above involve approximately the same problems in that a vapor equalizing line will probably be available in addition to the liquid transfer line. This vapor equalizing line is a pipe connecting from the vapor space in the top of the originating tank to the vapor space in the top of the receiving tank.

The fourth and fifth cases above do not lend themselves to the use of a vapor equalizing line and pose a different problem from the first three cases.

The sixth case is fast becoming a problem of major proportions and

is deserving of considerable discussion, in the hopes of arriving at a practical solution.

All transfers are made by the simple process of establishing a pressure differential between the two vessels. When a difference in pressure has been established between two containers, which are connected by a conductor, products will travel from the vessel of higher pressure to the vessel of lesser pressure. The rate of this transfer will be dependent on the type of conductor between the vessels, the amount of pressure differential, and on the viscosity of the liquid.

How Viscosity is Measured

Viscosity is the internal friction of a liquid which tends to reduce its flow. It is usually measured in seconds required for a given amount of the liquid to flow through a given orifice at a given temperature. Viscosity varies greatly in different liquids and increases with lowering temperatures. This increase in viscosity at lower temperatures is part of the explanation for the fact that we usually have more trouble transferring products in winter that in summer.

The pressure differential between two containers may be supplied by a difference in the elevation of the containers or of the liquid in the containers. This is the simplest method of establishing a pressure differential but is generally unsatisfactory due to the differential being small, and consequently the rate of flow is low. In this kind of transfer a vapor equalizing line is required if any appreciable flow is to be had. Without a vapor equalizing line the compression of the vapors above the liquid in the receiving tank will soon equalize the pressure due to difference in elevation of the liquid.

A very satisfactory method of supplying the pressure differential is by introducing a fixed gas into the container from which the transfer is to be made. The use of this method is limited by the lack of a source of supply of gas at sufficient pressure at most locations. The pressure differential available from this source is limited only by the pressure available from the outside source and the pressure limitations of the vessels involved. This method has the disadvantage of possible rise in the VP of the products being transferred, due to the gas going into solution in the products.

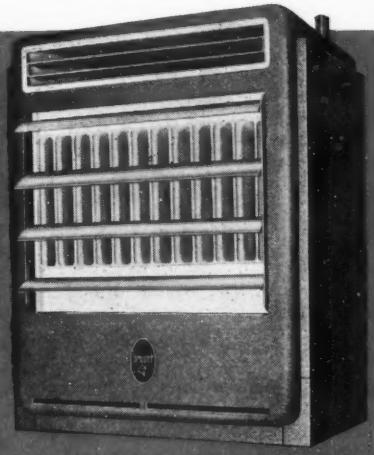
Hazards of Air and Oxygen

Just a word of caution in regard to this method of transfer: never use air or oxygen as a source of pressure to affect a transfer. Air may cause a violent explosion due to mixtures of gas and air; and oxygen is almost sure to cause such an explosion, as the explosive temperatures of oxygen and gas are relatively low.

By far the most common method of transferring products is with a pump, of some type, in the transfer line. This method of transfer actually involves two transfers; first from the original container to the pump and second from the pump to the receiving tank. The problem of getting the liquid into

Utilaire ... CONTROLLED COMFORT FOR STORES, OFFICES AND FACTORIES

TRIM, SMOOTH LINES of the Bryant *Utilaire* Gas-Fired Unit Heater adapt themselves to stores, offices, factories and other commercial or industrial establishments where controlled heat is required. *Utilaire* features new compact design with louvers and trim finished in aluminum. All controls are concealed from front view. *Utilaire* is made in six sizes, inputs 60,000 to 210,000 Btu per hour, all fully automatic.



THE BRYANT UTILAIRE—Model US-322 Gas-Fired Unit Heater with propeller-type fan. Working parts readily accessible, easy to remove or replace. Flue ways cleaned either from top or bottom of heat exchanger. Control adjustments are made from outside back of unit, and burner door provides easy access to burners. **ADJUSTABLE LOUVERS.** Standard horizontal louvers adjustable to direct air flow as desired. In some sizes louvers can be changed from horizontal to vertical by simply removing a few retaining bolts. In other sizes an extension is available. *Optional:* Combination horizontal and vertical louvers at extra cost. **RECYCLING LIMIT CONTROL** automatically protects unit against overheating. **CAST IRON BURNERS.** Specifically drilled for the type of gas to be burned.

...with the Bryant

HEVIGAGE STEEL HEAT EXCHANGER

Made from 12-gauge steel . . . approximately *three times* as thick as minimum A. G. A. requirements. Made by the industry's most advanced machine welding process. Individual sections are formed in one stroke on a huge press, machine welded across top to form a solid, streamlined tunnel. Sections are then welded together, front and back. Passageways provide straight-line flow, both horizontal and vertical. Each original section is U-shaped, and flames sweep only the full, unbroken thickness of 12-gauge steel. No weld is exposed to flame.

All Bryant products are approved by American Gas Association for use with natural, manufactured and LP-Gases.

bryant
AUTOMATIC HEATING

BRYANT HEATER COMPANY • CLEVELAND, OHIO

the pump is by far the most troublesome, as the pump will usually move the liquid on into the receiving tank if we can get it into the pump.

Locate Pump as Low Point

Since getting the liquid into the pump seems to be one of our most serious problems, let us investigate some of the considerations which affect this transfer. Most, if not all, of these considerations will also be applicable to the transfer of products directly from one tank to another by the use of a pressure differential. First of all there is the location of the pump. The pump should be located as low as possible in relation to the liquid level in the tank from which we propose to pump. This will give us the maximum pressure differential due to liquid head, and will facilitate the transfer.

Our next consideration will be the type of conductor between the tank and pump and the factors herein contained which will limit the flow of liquid to the pump. The size of the conductor should be as large as possible. On truck tanks the largest practical size will, in most cases, be 2" pipe. On stationary tank installations the size is usually increased to 3" or 4" and in some cases even longer.

Remember that pipe sizes are in proportion to the squares of their diameters; that is, a 2" pipe is four times as large as a 1" pipe, and has four times the liquid carrying capacity.

After we have determined the largest practical size for our conductor, we must give consideration to its length and the number and type of turns and valves to be used in the line. From flow tables or from calculations using flow formula, we find that approximately 2.5 ft. of water head or 5.0 ft. of LP-Gas head is required to move 50 GPM of LP-Gas through 100 ft. of 2" pipe. This figure is theoretical and we usually find that the actual flow under these conditions is something less than the above.

We mentioned that the number and type of fittings in the pump suction line was important, and here is a list of fittings with their equivalent length of straight pipe, for 2" size. In general these equivalents are larger in larger size pipe and smaller in smaller size pipe.

Fitting	Straight length equiv.
Gate valve, open	1.2 ft.
Globe valve, open	55.0 ft.
Angle valve, open	27.0 ft.
Std. elbow	5.5 ft.
Std. tee, turn.	12.0 ft.
45 elbow	2.5 ft.
Square elbow	12.0 ft.
Sudden contraction to ½ size	1.9 ft.
Sudden enlargement to double size	3.5 ft.
Ordinary tank outlet	3.0 ft.

Examining the above equivalents we notice that unless care is exercised in the selection of valves and fittings in the suction line it may be impossible for us to pump at anything except a very low rate, since the available head above the pump will probably be something less than three or four feet at the start of unloading a tank truck and near one foot at the finish. Please note that it will be necessary to reduce the transfer rate as the

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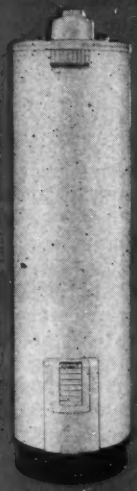
"TO SELL SUCCESSFULLY —SELL DAY & NIGHT"



DAY & NIGHT

AMERICA'S finest line of water and space heaters in the hands of an aggressive dealer assures a substantial, profitable business. Day & Night products meet every water and space heating need in the butane-propane field; they are nationally advertised by radio, home magazines, displays and complete color literature. They are backed by Day & Night's 35 years' experience —so, to sell successfully, sell DAY & NIGHT.

DAY & NIGHT MANUFACTURING CO.

MONROVIA, CALIFORNIA

ONE OF THE DRESSER INDUSTRIES

level in the supply tank lowers and reduces the available head for moving the liquid to the pump.

Some consideration should probably be given to the type of pump to be used. There are three principal types of pumps, each of which has its place in the general scheme of transferring liquids from one container to another. Reciprocating pumps involve a piston moving in a cylinder and a system of check valves to control the flow of liquid. They are most suitable for high head, low capacity jobs where the liquid to be handled is clean. Their capacity is not affected by suction and discharge pressures. They have the disadvantages of building up maximum pressures on the discharge when shut in, and are difficult to mount on mobile units with restricted space, such as a tank truck.

Rotary pumps involve a system of revolving pockets or compartments to move the liquid from the suction into the discharge. They are most suitable for low head, low capacity work and are very satisfactory for handling heavy liquids like tar and greases. Their capacity is not affected by suction and discharge pressure as they are, like reciprocating pumps, of the positive displacement type.

Centrifugal pumps, which are by far the most widely used in the LP-Gas industry, impart velocity to the liquid with a revolving impeller. They are suitable for low head, high capacity jobs. They maintain good efficiencies over the middle one-third of the capacity range, and may be shut in without developing excessive pressures, and without overloading the driver. They are comparatively small and light for a given capacity and lend themselves to mounting on mobile units, where they may be driven by the motive power of the vehicle through a special power take-off. Many new stationary installations are now using vertical centrifugal pumps with the pump proper located below the ground level to give added suction head.

All of the above pumps are designed for liquid service and will not do a satisfactory job of handling vapor or liquid-vapor mixtures.

Two Rules for Liquid Transfer

From the above we might formulate two simple rules to be followed in transferring LP-Gas products: (1) Do not try to pump more liquid than you can get into the pump through the suction line with the available head. (2) Do not allow outside heat to enter the fluid between the tank and pump.

In regard to this matter of transferring LP-Gas from a domestic tank to a truck or tractor fuel tank, I feel that the same principles can be applied as in the aforementioned transfers, but with some added problems due to the nature of installations. For aboveground tank installations, it will be relatively simple to locate a pump below the level of liquid in the tank. For underground tank installations, I think a pump could be designed in such a way that the pump itself would be below the tank and the power be applied at a point above the ground level.

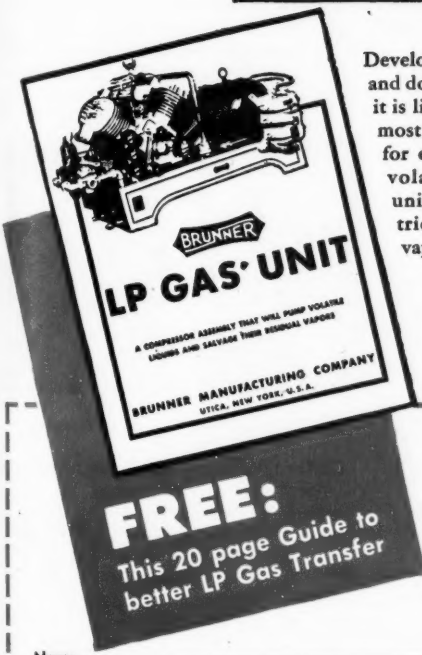
Empty the tank...

the residual gas is a large part of your profits!

BRUNNER

SINCE 1906

TANK UNLOADING UNITS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LP GAS UNIT
A COMPRESSOR ASSEMBLY THAT WILL PUMP VOLATILE LIQUIDS AND SALVAGE THEIR RESIDUAL VAPORS
BRUNNER MANUFACTURING COMPANY
UTICA, NEW YORK, U.S.A.

FREE:
This 20 page Guide to better LP Gas Transfer

Developed in the early days of the industry and doing a perfect transfer job ever since, it is little wonder that BRUNNER is the most widely recognized and wanted unit for efficient, safe and fast unloading of volatile liquids and gases. Brunner units leave nothing in the tank—retrieve that last 500 to 1000 lbs. of vapors—a self supporting installation.

BRUNNER MANUFACTURING CO.
Utica 1, New York, U.S.A.

Diagrams on piping, wiring and bottling plus technical data required by every operator. Already used to advantage by hundreds. Send for it.

Name_____

Address_____ City and State_____

THE TRADE

R. O. MONTRIEF

R. O. Montrief, of the Ward Heater Co., Los Angeles, has been appointed vice chairman of the heating division, Manufacturers Section of the Pacific Coast Gas Assn.

He takes over the post resigned by J. P. Tuck and will serve for the balance of the fiscal year.

Mr. Montrief is also currently president of the Institute of Gas Heating Industries of Southern California.

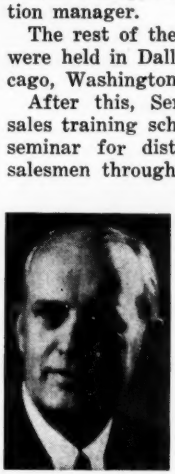
Frederick A. Stevenson, former president of American Car and Foundry Co., who retired from active service with the company in May, 1947, died suddenly July 29, in Wilmington, Del., while on his way to New York from Florida. He was 68 years of age.

Mr. Stevenson had been associated with ACF for more than 40 years in various capacities, as master mechanic, assistant general manager, assistant vice president in charge of operations, vice president, senior vice president and as president.

The new water heater seminar, sales training course, was presented to regional personnel of **Servel, Inc.**, Evansville, Ind., manufacturers of the Servel gas water heater, in a series of meetings which began in Evansville, July 19, and were conducted by Leland Feigel, sales manager of the company's water heater division, and Paul Kennedy, assistant sales promotion manager.

The rest of the series of meetings were held in Dallas, New York, Chicago, Washington, D.C., and Denver.

After this, Servel men will hold sales training schools, using the new seminar for distributor and dealer salesmen throughout the country.



G. M. GREENWOOD

C. V. COONS

Clifford V. Coons has been appointed vice president in charge of sales and G. M. Greenwood has been named vice president and treasurer of **Rheem Manufacturing Co.**, it is announced by R. S. Rheem, president.

Joining the Rheem company in 1934 as a timekeeper at the Richmond, Calif., plant, in 1939 Mr. Coons rose to the rank of manager of the Houston, Texas plant. In 1941 he went to New York as manager of container sales and since 1945 has been general

manager of sales. He will continue to make his headquarters in New York.

Mr. Greenwood, who joined the Rheem company in 1941 as treasurer, was made a member of the board of directors later that year. He will continue to be located in the company's San Francisco offices.

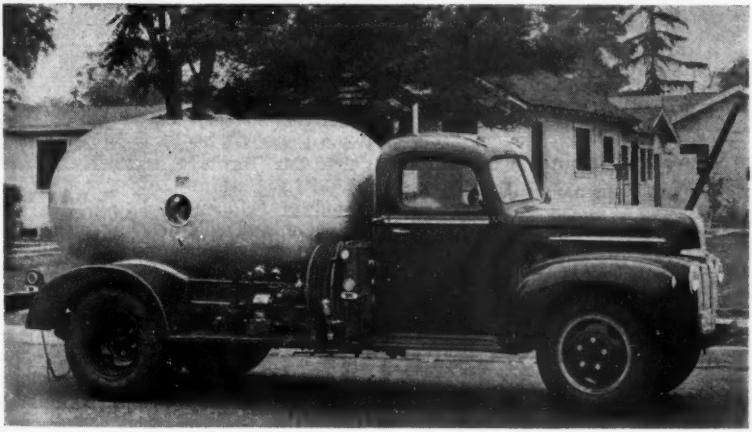
Caloric Stove Corp. has appointed William Y. Hill as district representative in the Washington, D.C., marketing area, comprising part of Virginia and Maryland in addition to the national capital.

The announcement is made by Julius Klein, Caloric vice president and general sales director. Mr. Hill's headquarters are at 4307 So. 16th St., Arlington, Va. The new Caloric district representative is a veteran in the gas range field.

The Handley Brown Heater Co., Jackson, Mich., announces the appointment of George T. Cary as representative in the Southern New England and metropolitan New York area. Mr. Cary has been in charge of distribution and sales in Virginia and the Carolinas. His new territory will embrace Metropolitan New York and the states of Massachusetts, Connecticut and Rhode Island.

GEO. T. CARY

Mr. Cary is an experienced gas man who will assist the dealers and distributors in his new territory on Handley Brown water heaters and conversion burners.



This high tensile steel tank and delivery truck were recently delivered to F. T. Carpenter, Rockgas Service Agency, Phoenix, Ariz. The tank was built by Superior Tank and Construction Co., Los Angeles.

Use PITCO
'KEEP 'EM FRYING"

Frialators

REG. U.S. PAT. OFFICE

SAVE FAT . . . GAS SPACE

Deep-Fat Frying at Its Best

★ Customers can serve a wider variety of fried foods.

★ Left-overs or by-products quickly converted into daily specials.

★ Increase in customer business means increase in the gas load.

★ Actual saving in fat alone more than pays total cost of gas required to operate them.

J. C. PITMAN & SONS SALES CORP.
711-719 Broad St.
West Lynn, Mass.

J. D. BOWEN

J. D. "Doug" Bowen has been newly appointed as sales representative of **Delta Tank Manufacturing Co., Inc.**, of Baton Rouge, La., and Macon, Ga. Mr. Bowen will handle the Mississippi territory for Delta Tank.

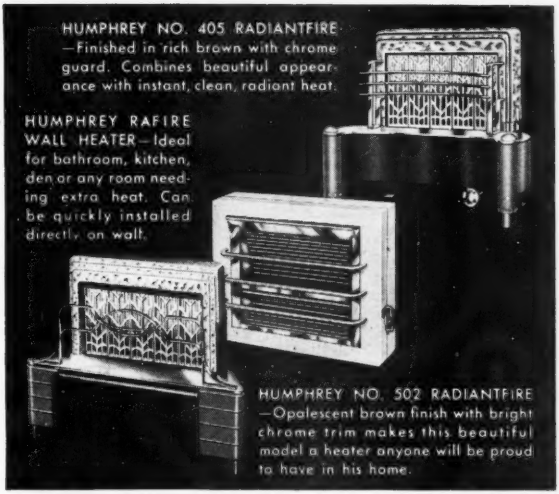
Just before joining Delta, he was a partner in the Tennessee Propane Gas Co. and previous to that had been affiliated with Southern Gas and Equipment Co. at Tulsa, Arkansas Foundry Co. at Little Rock, and National Butane Co. at Memphis.

E. E. HAWLEY

Gasair Associates, liquefied petroleum gas equipment specialists, have named Edwin E. Hawley as chief engineering associate. With headquarters in their San Francisco offices, Mr. Hawley heads Gasair's staff of field engineers, and will also personally supervise the engineering, installation and servicing of Gasair units and other types of LP-Gas equipment.

Mr. Hawley's experience in the LP-Gas industry dates from 1938, at which time he engineered many industrial installations for the Ransome Co., of Emeryville, Calif. Since that time he has been actively engaged in the design and construction of LP-Gas equipment and installations for utilities and industrial users.

HUMPHREY . . . leads the style parade in 1948



HUMPHREY NO. 405 RADIANTFIRE —Finished in rich brown with chrome guard. Combines beautiful appearance with instant, clean, radiant heat.

HUMPHREY RAFIRE WALL HEATER—Ideal for bathroom, kitchen, den or any room needing extra heat. Can be quickly installed directly on wall.

HUMPHREY NO. 502 RADIANTFIRE —Opalescent brown finish with bright chrome trim makes this beautiful model a heater anyone will be proud to have in his home.

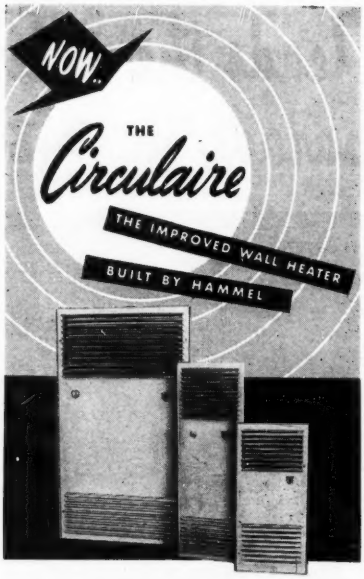
Humphrey products have always been known for the finest designs in radiant heaters. But the Humphrey line for 1948 is better than ever. All feature a rich finish that blends well with all types of furniture and styles of decoration. Each is set off with just the right amount of chrome trim for sparkling good taste. And they are carefully built of the best materials to provide clean, efficient, comfortable heat for years.

For leadership in style . . . for leadership in construction . . . for leadership in comfort . . . you can depend on Humphrey gas burning appliances.

GENERAL GAS LIGHT COMPANY
KALAMAZOO, MICHIGAN

A HUMPHREY PRODUCT

23 WARREN STREET, NEW YORK CITY • 2nd UNIT SANTA FE BLDG., DALLAS • 225 ELEVENTH STREET, SAN FRANCISCO



IN A COMPLETE RANGE OF SIZES from 11,500 to 48,000 BTU.

CIRCULATES—Circulating, warm air . . . even heat distribution

VENTED—Fully vented . . . no sweaty walls.

CONVENIENT—External burner control . . . parts easily accessible for service through lower grille.

SAFE—No open flame . . . no exposed element

ATTRACTIVE—Baked enamel finish, designed to blend with any wall or room treatment.

OTHER FEATURES—Heavy duty, steel heating element . . . no pit or basement needed . . . no floor space required, projects only 3" into room . . . easily installed in standard 4" wall, in new construction or old.

Hammel
RADIATOR ENGINEERING CO.
Owned and Operated by A. S. Mortimson and Associates
3348 Motor Ave. Los Angeles 34

Firms with which he has been associated include Gasair Corp., Gasair Division of Eaton Metal Products Co., and the Pacific Gas Corp.

FRANKLIN WEDGE

Franklin Wedge, former eastern manager for **Ansul Chemical Co.**, has been appointed assistant to the president. He has moved from Philadelphia to the company's main office at Marinette, Wis.

With this assignment, Mr. Wedge, a well-known figure in the refrigeration industry, completes an 18-year career with Ansul. He is a member of the American Society of Refrigerating Engineers as well as the American Chemical Society.

Liquid-level gauges in mobile use is the theme of a display currently being shown throughout the country by **Taylor Sales,** Dallas, distributors of "Visible" butane-propane precision made gauges.

The motion display unit had its premier at the International Trade Show, Sacramento, and was next shown to Texas Butane Dealers in convention at Austin.

A series of three background panels illustrates the gauges and charts their pertinent features. In the foreground, an LP-Gas tank is placed on an ingenious device that keeps it in a constant rocking motion. Mounted in the tank are a number of "Visible" gauges while a large plexiglas window in the tank permits an unobstructed view of the action and punishment the gauges are taking. Overhead a greatly enlarged dial face illustrates the mag-

netic pointer in motion. While the demonstration of the gauges in the tank is far more severe than would be experienced in actual use, the display does reaffirm their rugged construction.

Taylor Sales has recently moved into new and enlarged quarters with display space and ample warehousing facilities.

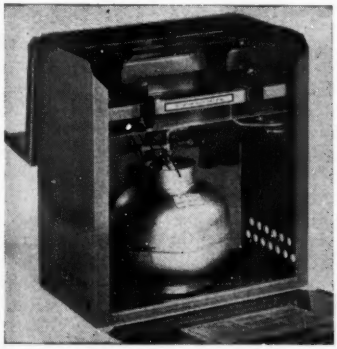
John C. Pankow, director of sales of the **Detroit-Michigan Stove Co.**, has announced the appointment of John M. Storm, Jr., as district manager in the company's Southwestern division.

Mr. Storm will work under the direction of Jack Little, Southwestern division sales manager, and will handle both domestic and commercial cooking equipment.

N. R. IRVINE

Norman R. Irvine, according to a recent announcement by **Pressed Steel Tank Co.**, Milwaukee, has returned to that organization as a sales representative, after spending over five years with the United States Army. For the majority of his time in the army Mr. Irvine was concerned with atomic research.

As sales representative with Pressed Steel Tank Co., Mr. Irvine again takes up civilian duties, representing the metal container manufacturer in several Southern states.



The KAMPER KING shown above is open and ready to light. Cover folds back to form shelf. Two burners supply immediate, fast heat. Small I.C.C. one-gallon tank is stored below and is easy to remove and refill.

Size: 16¾"x16"x9"
Shipping weight: 35 lbs.

10 Year Service Warranty
1 Year Unconditional Guarantee

KAMPER KING

The Ideal LP-Gas Camp Stove for

HUNTERS • CAMPERS • BOATS •
CABINS • TRAILERS • ETC.

KAMPER KING is the finest and most modern camp stove ever produced . . . the only advancement in camp stoves in the last quarter century. There are numerous uses for this practical stove. The "smart" camper will want one.

The KAMPER KING is safe, strong, durable; made entirely of heavy gauge steel. The tank will supply fuel for 16 hours (using both burners). Stove folds up like a suitcase; is easy to pack and transport. It has every safety feature; is simple to operate. It can be serviced by refilling the tank or by a quick exchange.

Trinity Manufacturing Co.
139 N. First Street • Burbank, California

EXTRA

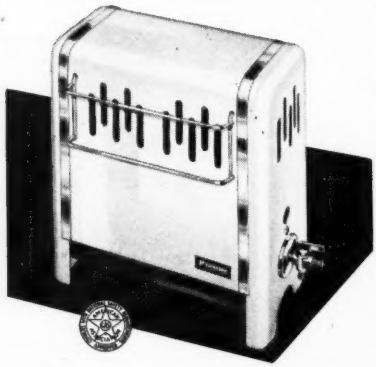
Comfort Capacity

WITH

Premier

Small Room

GAS HEATERS



All Premier Gas Heaters are A.G.A. approved for use with L.P. gases as well as natural and manufactured.

Premier's super-efficient small room heaters have extra large heating capacity (14,000 Btu.), for quick comfort during cold snaps. They're a popular fast moving item. Available in white for bathrooms (illustrated) or brown porcelain enamel, both with chrome trim.

There are a few choice dealer and distributor territories still available—write today for details about our money-making proposition.

Premier

SINCE 1912

STOVE COMPANY

100 South Sixteenth Street Belleville, Illinois

J. L. HEGENER

McCulloch Motors Corp., Los Angeles mnaufacturer of chain saws, gasoline engines, and gas heaters, has announced the appointment of Joseph L. Hegener as secretary-treasurer of the company. He had been comptroller of the company since 1946.

Mr. Hegener is a graduate of the College of Business Administration at Marquette University, and received his C.P.A. certificate from the state of Wisconsin in 1941. He is one of the nucleus of McCulloch Motors' executives who moved with the company from Milwaukee when the Los Angeles headquarters were established in 1946.

New staff appointments in both the sales and engineering departments of **The Weatherhead Co.** are announced by Albert J. Weatherhead, Jr., president of the Cleveland concern. Heyliger Church, vice president in charge of sales, has been advanced to executive head of all sales divisions, both foreign and domestic. R. P. Gibson, formerly vice president in charge of the automotive sales division and manager of Weatherhead's Detroit office, has been appointed vice president-general sales manager. Mr. Gibson will carry on his new activities from the home office in Cleveland. M. C. Peterson, who recently joined the company as sales manager of the industrial hose division, has been appointed assistant general sales manager.

Mr. Weatherhead has also announced two new appointments in the engineering department: John D. Baldwin, Jr.

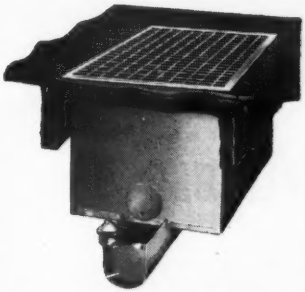
Why - IS THE HOLLY Stubby SO POPULAR?

★ Extra shallow design — watertight within 19" of floor — requires no pit — reduces installation costs.

★ All operating parts are in the quickly removable watertight pan. A patented feature.

★ New, efficient, quiet heating element moves more air — produces soft, no-draft heat — overwhelming user preference. Write for details.

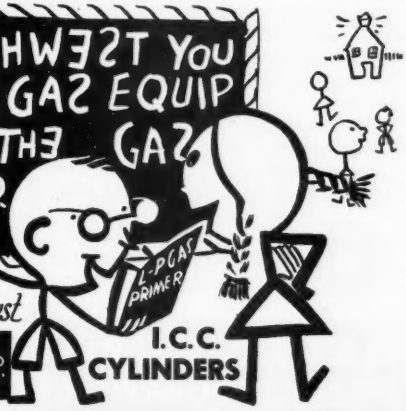
Holly Stubby meets all L-P Gas appliance requirements.



HOLLY MANUFACTURING CO.

855 SO. ARROYO PARKWAY PASADENA 2, CALIF.

IN THE SOUTHWEST YOU GET YOUR L-P GAS EQUIPMENT FROM THE GAS EQUIPMENT CO. DALLAS



because they distribute the best

REGO LP GAS EQUIPMENT

BRUNNER TANK UNLOADING UNITS

Aeroquip INDUSTRIAL HOSE

I.C.C. CYLINDERS

GAS EQUIPMENT COMPANY, Inc.

P. O. BOX 566

2620 South Ervay « DALLAS, TEXAS

GEC GAS EQUIPMENT COMPANY, Inc.

HARRISBURG

Pioneer Producers of High Pressure Seamless Steel Cylinders Is Now Manufacturing

L-P GAS CYLINDERS

When it comes to selecting a cylinder, you can't be too careful. You look for exceptional construction, durability and uniform high quality. But...most important, you look for the name . . . a name that will inspire CONFIDENCE in its construction and ASSURANCE in its performance . . . and nothing can be more of an assuring factor than EXPERIENCE. We have been serving American industry for almost a century . . . specializing in High Pressure Cylinders for over forty years of this time.

Why not let us quote on your requirements for prompt delivery?

HARRISBURG STEEL CORPORATION
HARRISBURG PENNSYLVANIA

Alloy and Carbon Steels • Seamless Steel CO_2 Liquefiers • Pipe Couplings • High Pressure Gas Cylinders Drop and Hollow Forgings • Forged Steel Pipe Flanges.

H. CHURCH

R. P. GIBSON

as chief product engineer, and Charles H. Crawley as chief design engineer. Both have been with Weatherhead since 1927.

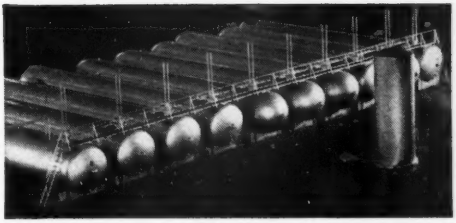
The Weatherhead Co. is a producer of liquefied petroleum gas cylinders, regulators, fittings and equipment. They operate four plants in the United States and one in St. Thomas, Ontario, Canada.

T. E. Gammage, Sr., president and chairman of the board of **Pan American Casualty Co.**, of Houston, Texas, announces that the authorized capital stock and surplus of the company has recently been increased in the amount of $250,000. The completion of this financing has provided the company with capital and surplus of over $500,000.

Mr. Gammage says that his company has the facilities for handling all types of insurance coverages for the liquefied petroleum gas operations, including safety engineering department, headed by L. E. Davis, formerly LP-Gas inspector with the Gas Utilities Division of the Texas Railroad Commission. The company recently added workmen's compensation insurance to its present list of coverages so as to completely round out

Another Interesting Propane Illustration Showing **TANKS** *Fabricated by*

DOWNINGTOWN



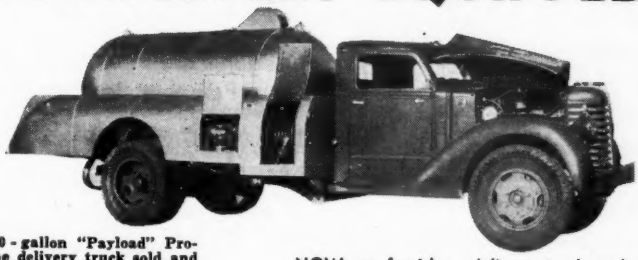
(Photo courtesy of United Petroleum Gas Company, Milwaukee, Wis.)

Those interested in purchase of bulk Storage Tanks, for Propane must consider the following factors: Proper design, Quality of workmanship and Availability and Quality of materials from which they are fabricated. Downingtown's knowledge of design and materials, qualified personnel, checking of welding operations by X-Ray, fabrication to meet A.S.M.E. and National Board PLUS inspection and approval by the Hartford Steam Boiler and Insurance Company PLUS many years of association with sources of supply of raw materials should prove of value to you. The plate situation is critical; therefore, we suggest you anticipate your requirements. May we help you?

DOWNINGTOWN IRON WORKS
DOWNINGTOWN, PA.
WELDED and RIVETED PRODUCTS

NEW YORK OFFICE: 30 CHURCH STREET

COMPLETELY EQUIPPED!



1200 - gallon "Payload" Propane delivery truck sold and equipped by us for Central Propane Gas Co., Yakima, Washington.

NOW we furnish a delivery truck tank completely equipped. Single or double tanks for Propane or Butane. Built under U68 or U69. For the best design and efficiency write, wire or phone us today.

BUTANE NATURAL GAS PROPANE ACME CARBURETION

ACME EQUIPMENT CORP.
313 SO. PEARL ST. — DALLAS 1, TEXAS
Phone R-4089

NOW is the Time to place your orders for Gas Circulators and Heaters.

Wide Awake Dealers with an eye to Big Volume Profits are getting their Heaters NOW. Material shortages will not worry them come fall.

Don't let Winter catch you napping . . . You, too, will need plenty of Peerless Gas Circulators and Heaters. See your Distributor NOW and order ALL your requirements.

The Peerless Line has greater consumer demand—high quality—dependability—that create volume sales—big profits.

Heaters and Circulators for All Gases A. G. A. Approved.

Peerless
MANUFACTURING CORPORATION
INCORPORATED
LOUISVILLE, KENTUCKY

the insurance program for the LP-Gas industry.

The company has been operating only in Texas, but contemplates entering other states and expanding its activities.

CHAS. E. LYALL

Ellsworth L. Mills, vice president, **The Bastian-Blessing Co.**, Chicago, announces that Charles E. Lyall has joined the "Rego" Division as sales engineer.

Mr. Lyall was educated at Trinity College School in Ontario, Canada, and at the University of Toronto. He was employed as junior engineer for the hydraulic division of the National Research Council in Ottawa, as junior engineer for the Hydro Electric Power Commission of Ottawa, and as instructor of mechanical engineering at the University of Toronto.

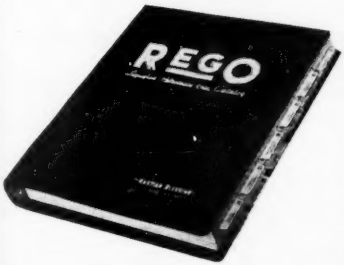
Oregon's Multnomah Fuel Co. Issues Pamphlet for Prospects

An illustrated consumer piece was recently published by the Multnomah Fuel Co., Portland, Oregon. All applications of LP-Gas are discussed in terms pointed at the consumer, either prospect or user.

The folder is titled, "You Can Take Life Easier With Propane" and the message within is addressed both to the home-owner and businessman.

Graphic illustrations show many of the fuel uses on farms, in houses and in industry and meets a need that has long existed in introducing LP-Gas in Oregon.

More Than Just a Catalog...



...it's a reliable reference source when you are planning and specifying for LP-Gas installations.

See pages 104 and 105 for complete facts!

exclusive factory distributor

REGO LP GAS EQUIPMENT

In
ARIZONA
CALIFORNIA
IDAHO
MONTANA
NEW MEXICO
NEVADA
OREGON
UTAH
WASHINGTON
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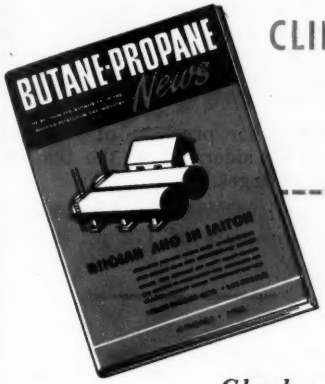
Western Gas Equipment Co.

Office and Warehouse
202 N. GARFIELD, P. O. Box A MONTEREY PARK, CALIF.
Phone Cumberland 3-2239



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Enter my subscription to BUTANE - PROPANE NEWS to begin with the next issue

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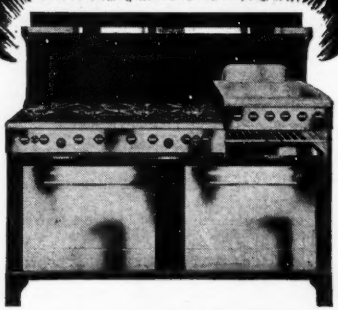
STREET CITY ZONE STATE

GLEAMING BEAUTY
with rugged strength
in every detail of design



Your cafe customers will take pride in the sparkling beauty of these new ECONOMY DeLuxe Ranges—they'll appreciate the long-lasting durability in every detail of construction. ECONOMY Ranges are custom built, with choice of burner and griddle arrangements. ECONOMY advantages giving your customers extra value include:

- √ Cast-iron top grates and welded angle-iron bracing throughout.
- √ Easy-to-clean nickel steel stainless finish on oven doors and trim.
- √ Heat-proof door springs never require adjustment.
- √ Ceramic reflectors on grill burners for fast broiling.

FREE—Be prepared to supply your customers with these handsome new ECONOMY Ranges. Send NOW for catalog 98-M showing ECONOMY DeLuxe Cafe Ranges and Griddle Ranges designed and engineered specifically for LP gas.

COMSTOCK-CASTLE STOVE CO.
QUINCY, ILLINOIS

ECONOMY
De Luxe CAFE RANGES

Underground Tanks

Installation Methods and Moisture Problems

By GEORGE BOLANDER

Union LP-Gas Systems, Parsons, Kansas

In Two Parts—Part I

THE subject is the handling and installation of aboveground tanks. The systems to be described are designed and built for the storage of propane, which is to have a vapor pressure not to exceed 200 psi gauge at 100° F.

Propane, unlike gasoline, is a liquefied petroleum gas which develops a vapor pressure when confined in a sealed container. This property makes it possible for us to use it in our batch vaporization systems.

The vapor pressure of this gas varies considerably as the temperature changes.

Propane at 100° F will develop a vapor pressure of 172 psi and at

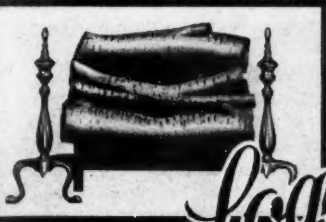
---

MR. BOLANDER presented the accompanying paper at this year's service school held under the auspices of the Kansas LP-Gas Assn.

The subject is one that concerns every operator for it involves the dependability of service rendered to the customer which, of course, marks the reputation of the fuel, and indirectly the reputation of the dealer. —Editor.

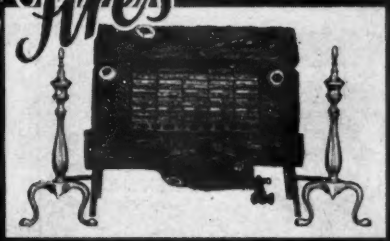
FOR NATURAL-MIXED-MANUFACTURED & L-P GAS

HEAT-LITE CLUSTERS



OFFERED HERE ARE GENUINE RADIANT HEATER MODELS (2 SIZES) NATURAL OAK TREATMENT. ALSO HEAT-LITE LOG CLUSTERS (OAK OR BIRCH) WITH "SHADOW SPINNER" IDEAL FOR FIREPLACE DECORATION ----YET REAL HEATMAKERS

Log Fires



Listed in CATALOG NO. 48 (Copy on Request)

The OHIO FOUNDRY & MANUFACTURING CO. Steubenville Ohio

RADIANT LOGS

QUALITY HEATING EQUIPMENT SINCE 1846

Butane & Propane

Producers of high quality
Liquefied Petroleum Gases Since 1931
Wholesale Only

THE CARTER OIL COMPANY

TULSA, OKLAHOMA

Liquefied Petroleum Gas

Cities Service Oil Co.

•

A DEPENDABLE SOURCE
UNIFORM PRODUCTS
A CAPABLE SUPPLIER
TWENTY YEARS' EXPERIENCE

•

IN LP GAS ALSO
CITIES SERVICE
MEANS
GOOD SERVICE

•

CITIES SERVICE
OIL CO.
(Del.)

•

BARTLESVILLE, OKLA.
CHICAGO, ILL.
Other Sales Offices
Cleveland Kansas City
St. Paul Toronto

60° F the gauge pressure has dropped to 92 psi. The gauge pressure is zero at —44° F. The important point is that the vapor pressure at low temperature is very low. At 10° F above zero, the vapor pressure is 31 psi gauge. At zero, the vapor pressure is 23.5 psi gauge and at -10° F the vapor pressure is down to 16.7 psi. These low temperatures are referred to not only because they occur in the winter in the Northern region, but also because there is a good possibility that they will occur in the liquid fuel of your system when the outside temperature is well above freezing.

Gets Heat From Atmosphere

It takes approximately 160 Btu's at 30° F to vaporize 1 pound of liquid propane. The "latent heat of vaporization" must be supplied by the liquid fuel in the tank and the surrounding atmosphere. This required heat to be supplied is considerable when the draw-off from the tank is large and may result in very much lower temperatures in the tank than are experienced in the atmosphere. Lower temperature of the liquid means lower pressure. As a matter of fact, under severe conditions of withdrawal, it may be possible that the liquid temperature in the tank is as much as 20° to 60° F below the temperature existing on the outside.

The capacity of a tank to produce sufficient heat to vaporize the liquid depends directly on the surface area of the tank and the amount of liquid in the tank. The more liquid there is in the tank, the better will be the chance for higher

HEMISPHERICAL HEADS

FOR STORAGE TANKS AND UNFIRED PRESSURE VESSELS

API-ASME CODE

One Piece Type in—15"-16"-19"-24"-28" Outside Diameter
38"-40½"-48" Inside Diameter

Segmental Type in—48"-57½"-60½"-76½"-
108"-126" Inside Diameter

Write for our Tank Head Catalog

THE COMMERCIAL SHEARING & STAMPING CO.

P. O. Box 719 Youngstown 1, Ohio

Service — en route to you!

Utility LP-GAS SYSTEMS — World famous ...

ALL SIZES ARE AVAILABLE AT OUR PLANT

ASME-API, ASME CODES • NATIONAL BOARD INSPECTION

for surface or underground —Quality Unsurpassed

A CARAVAN OF Utility SYSTEMS DAILY BECOMES A MOVING BILLBOARD FROM OUR PLANT TO DEALERS—WHEREVER THEY MAY BE. WE MAINTAIN A FLEET OF TRUCKS FOR READY DELIVERY.

SPECIAL PRODUCTION OF: —PROPANE—

300 GALLON —500 GALLON —935 GALLON

BUTANE EQUIPMENT CO., INC. 3301 S. LAMAR DALLAS, TEXAS

your most dependable source of brass fittings

a complete line of brass fittings for copper tubing installations for gas and oil line use.

Write for Catalog LP-1

C-S

BRASS MFG. CO.
148 W. 62nd St., New York 23, N. Y.
PLaza 7-2295

vapor pressure. The less liquid in the tank, the lower will be the temperature of the liquid propane and the vapor pressure above the liquid.

In the more severe climate it is easily possible to overtax a propane system when the temperature is very low and the liquid level in the tank has fallen considerably. Conditions may occur where it will be impossible for a propane tank to produce the amount of gas required in an ordinary household. The disadvantage of this condition must be considered in installations where heavy withdrawals are necessary.

Regulator Is Pressure Reducer

Now to see what effect these low inlet pressures have on the regulators. The LP-Gas regulator is a pressure reducer wherein the opening of the valve is controlled by the pressure exerted on a diaphragm on the low pressure side.

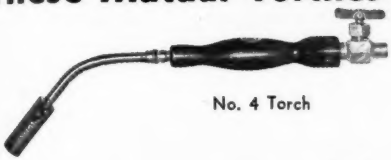
We are all more or less familiar with regulators. The large spring mounted on the far side of the diaphragm is adjusted so that if 11" wc pressure exists at the low pressure side, a flow of 30 cu. ft. of gas per hour is permitted to pass through the valve at an inlet pressure of 100 psi gauge.

These are the standard Underwriters' requirements.

The propane regulator is called upon to deliver gas at 9" to 11" wc with inlet pressures ranging from 200 psi to a few pounds. At very high inlet pressures, the pressure against the valve disc tends to force the valve open, assisting force of the regulator spring.

It will take approximately 12" wc pressure against the full area of the diaphragm to balance these

These Mutual Torches Are Load Builders



No. 4 Torch

No. 5 Blow Torch

No. 8 Paint Burner-Scraper

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COLUMBIA, PA.

two forces and keep the valve closed. This is the so-called "locking pressure." As the balancing pressure is reduced, the valve opens slightly, allowing the gas to expand into the chamber.

If the inlet pressure is very low, say in the order of a few pounds, the spring will get no assistance from the incoming gas and it will have to do the work of closing the valve by its own power. To balance the force of the spring alone, a slightly lower force is required at the diaphragm, or approximately 10" wc.

All this indicates that the opening at the valve will be a very fine slot at high inlet pressures and somewhat larger at low inlet pressures. The capacity of a regulator is established by the amount of gas the valve allows to pass under certain inlet and outlet pressures.

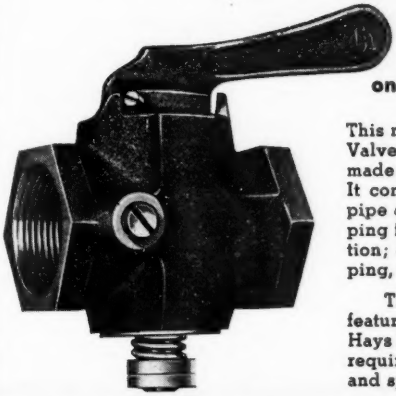
Minimum Pressure for Rating

Since it is a well established fact that regulators which satisfy the underwriters' specifications will pass several hundred cubic feet at outlet pressures slightly below this figure, it is well to consider the rated capacity at outlet pressures of approximately 9" wc. This pressure is considered by many the minimum adequate pressure for purposes of rating.

Since it is entirely possible with a heavy draw-off that tank pressures may run as low as 10 psi, it seems only reasonable to rate a regulator at this pressure, providing, of course, that it has originally been set at 30 cu. ft. delivery at 11" wc with 100 lb. inlet pressure.

If we were to rate the regulator

. . . . with Pilot Tapping



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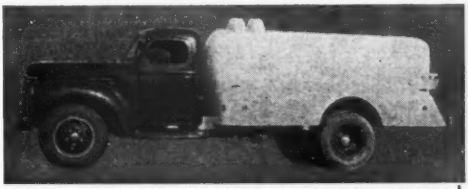

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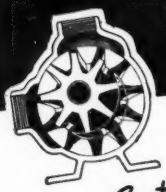

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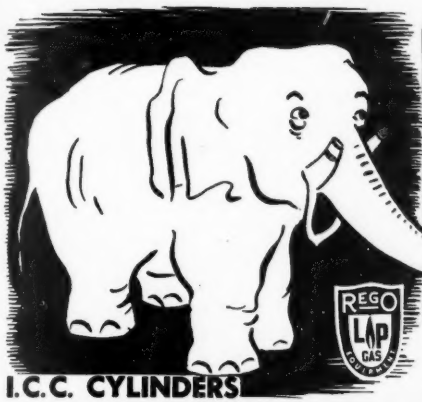
at approximately 9" wc and at 10 psi, we would say it will pass 240 cu. ft. per hour. This figure is well below the flow at higher inlet pressures. In applying this flow capacity to a given job, it should be kept in mind that a safety factor must be applied which in my opinion should be at least 2, thus giving us a rated capacity of 120 cu. ft. per hour.

Now what will 120 cu. ft. per hour flow do for us? The heat value of a cubic foot of propane is approximately 2500 Btu—2500 x 120 cu. ft. per hour equals 300,000 Btu's per hour. This load is considered sufficient to provide the peak demand in the average household in cold climate.

When To Manifold Regulators

There is, however, one remaining consideration. At very heavy withdrawals and severely cold weather, tank pressures as low as 5 psi, and even lower, have been encountered. At this pressure the flow capacity of a regulator is greatly reduced. In such cases, it is necessary to manifold two regulators. It is also desirable to manifold two regulators where demands greater than 200 cu. ft. per hour exist.

Some of the remarks made in connection with the regulator also apply in a discussion of adequate tank size for a given installation. We have seen that a peak demand for 300,000 Btu's per hour can be supplied by the regulator under ordinary conditions. In your work of supplying the correct size system to your customer, you work from experience and from specified capacities of the appliances, and you



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know the required peak load in Btu's for a given installation. My point is, if a regulator is supplied with sufficient gas at high enough inlet pressure, it will deliver the requirements for most installations. Often, however, trouble is encountered not due to the inability of a regulator to pass sufficient gas, but due to the inability of a tank of small size to produce sufficient gas at high enough pressure.

The transfer of heat from the atmosphere outside of the tank through the tank wall is a most important function in the LP-Gas system.

In fact, you may consider the outside temperature as the real means to allow the system to function. In effect, if you insulated the tank thoroughly and continued to draw off gas, you would soon have exhausted all the heat in the liquid and its temperature would reach the -44° F where no pressure will be generated.

Assume that on cold days, the consumption at a particular installation is 40 gallons of propane per day. Forty gallons at 4.2 lbs. per gallon means that 168 lbs. per day, or 7 lbs. of liquid propane, must be vaporized per hour for continuous operation. This corresponds to a continuous draw-off of 150,000 Btu's per hour.

This paper will be concluded in the October issue.